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PUREX Plant Aggregate Area Management Study Technical Baseline Report

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ACRONYMS

AFAN	ammonium fluoride-ammonium nitrate
amsl	above mean sea level
BHI	Bechtel Hanford, Inc.
c/m	counts per minute
DOE	U.S. Department of Energy
NEPA	*National Environmental Policy Act*
OWW	organic wash waste
PNL	Pacific Northwest Laboratory
PUREX	plutonium uranium extraction
PVC	polyvinyl chloride
RL	U.S. Department of Energy, Richland Operations Office
SST	single-shell tank
TBP	tributyl phosphate
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
UNH	uranyl nitrate hexahydrate
UO_3	uranium oxide
UPR	unplanned release
VCP	vitrified clay pipe
WHC	Westinghouse Hanford Company
WIDS	waste information data system

1.0 INTRODUCTION

This document is prepared in support of the plutonium uranium extraction (PUREX) Plant Aggregate Area Management Study in the 200 East Area at the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. It provides a technical baseline of the aggregate area and results from an environmental investigation undertaken by the Technical Baseline Section of the Environmental Engineering Group, Westinghouse Hanford Company (WHC) and by EBASCO, providing support under contract to WHC. This document is based upon review and evaluation of numerous Hanford Site current and historical reports, drawings and photographs, supplemented with site inspections and employee interviews. No intrusive field investigations or sampling were conducted.

This document was written in 1991 and has been edited for publication as a Bechtel Hanford, Inc. (BHI) document to allow the information to be referenced in current documents. Some information identified as current, as of 1991, may not be current as of 1995 because of changes in mission, scope, plan, or political climate.

Most of the historical documents from which data was extracted for this document provide dimensions in nonmetric units of measure. In the interest of accuracy, data is reported here as it was provided in reference documents and no conversions to metric are provided.

The PUREX Aggregate Area is made up of six operable units; 200-PO-1 through 200-PO-6 and consists of liquid and solid waste disposal sites in the vicinity of, and related to, PUREX Plant operations. Figure 1-1 depicts the location of each operable unit. Hanford Site photographs are provided in Appendix A and the photographs and drawing list is provided in Appendix B.

This report describes PUREX and its waste sites, including cribs, french drains, septic tanks and drain fields, trenches and ditches, ponds, catch tanks, settling tanks, diversion boxes, underground tank farms, and the lines and encasements that connect them. Each waste site in the aggregate area is described separately. Close relationships between waste units, such as overflow from one to another, are also discussed.

An environmental summary for this aggregate area is not provided here. An excellent summary may be found in *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1990) that describes geology and soils, meteorology, hydrology, land use, population, and air quality.

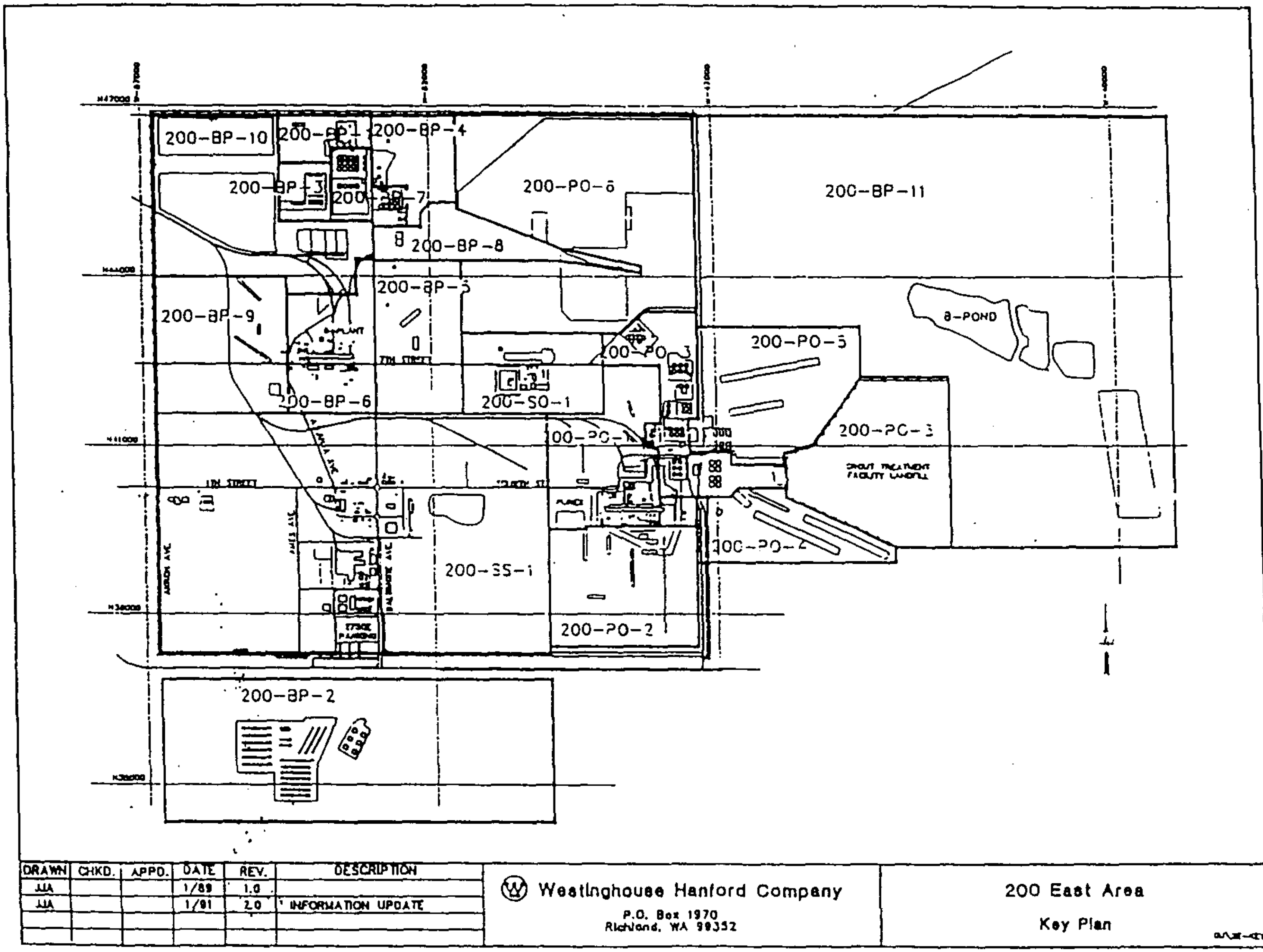


Figure 1-1. 200 East Area Site Location Map.

2.0 BACKGROUND

2.1 PUREX DESCRIPTION

PUREX is the central feature and key operational facility of the aggregate area and is therefore described here even though it will not be remediated as part of this aggregate area. Figure 2-1 depicts the general area of the waste management facilities discussed in this report.

Uranium-bearing fuel rods were irradiated in one of the several Hanford nuclear reactors; a process that creates plutonium from uranium. The irradiated rods were transferred to PUREX where plutonium, uranium, and neptunium were separated from fission products and from each other.

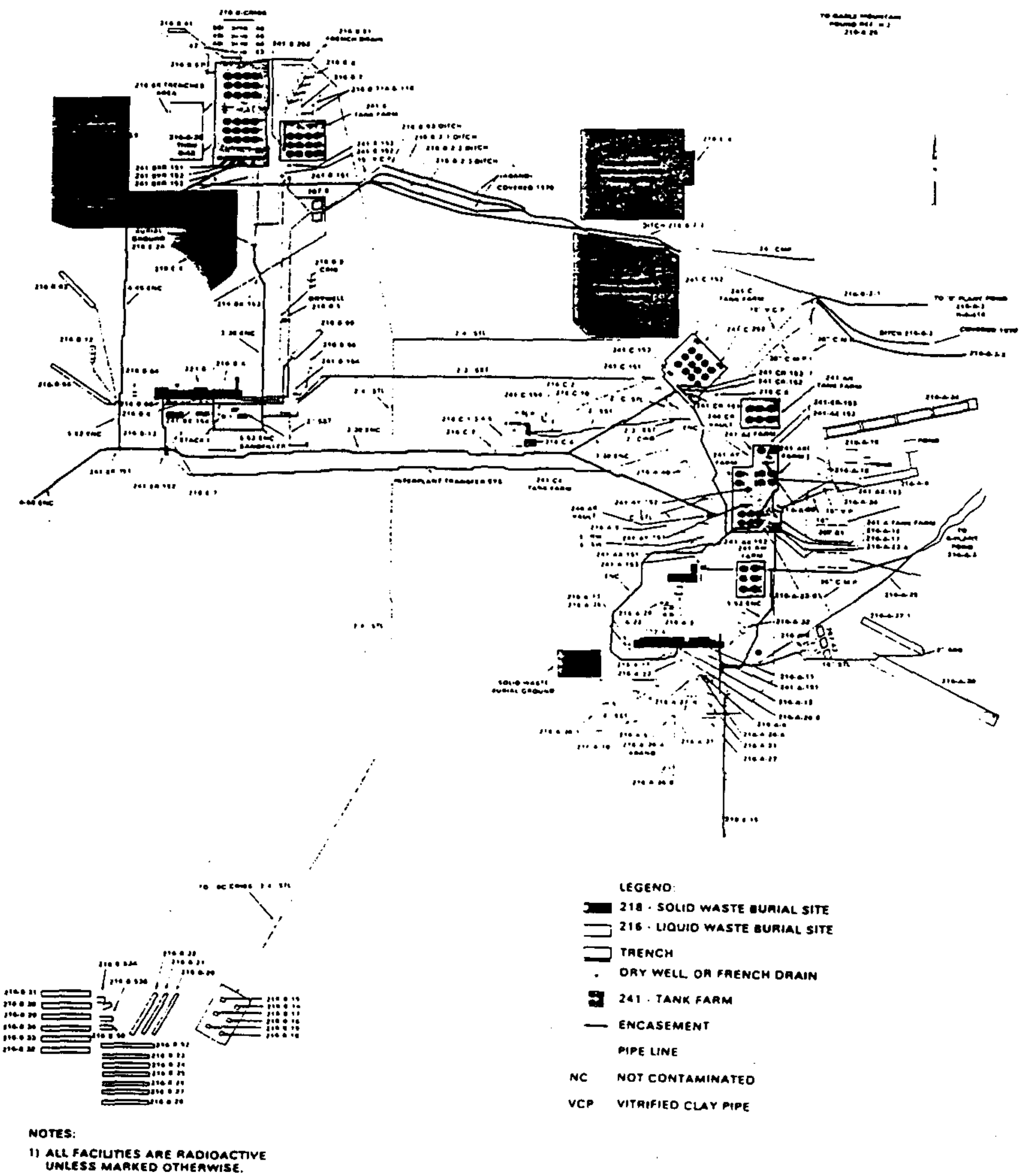
PUREX refers primarily to the 202-A building; a chemical separation facility constructed between 1953 and 1955 to chemically extract plutonium, uranium, and neptunium from irradiated uranium fuel rods, and to related buildings and facilities in the immediate area.

PUREX operated from 1955 until 1972 when it was shutdown due to a low demand for plutonium and remained down until 1983 when it became operational and has remained so until the date of this report.

PUREX is the latest of five Hanford canyon buildings; so called because of their monolithic size and the canyon-like appearance of their upper galleries. It is 1,087 ft long, 120 ft wide, and 102 ft high with about 40 ft of this height below grade. It is constructed entirely of concrete. Its process equipment is contained in 12 fully enclosed rooms, called cells, that are arranged in a row in an area spanned by a traveling crane. The only access to cells is through ceiling openings that are closed with 4-ft-thick concrete blocks. These are removable by crane to provide access to the cell beneath. Above the blocks is a space equal in height to the cell depth, thus providing headroom for manipulating the process equipment during maintenance operations. Heavy concrete shielding walls enclose this space up to the level of the crane rails, giving the appearance of a canyon (AEC 1964; Hodges 1989).

PUREX chemical separation processes are based on dissolving the jacketed fuel rods in nitric acid and conducting multiple purification operations on the resultant aqueous nitrate solution. The process involves fuel-element decladding, uranium metal dissolution, solvent extraction, ion exchange, and product loadout.

Figure 2-1. Schematic Diagram of the 200 East Area Waste Management Facilities.



Volume one of the *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford* (Stenner et al. 1988) provides the following generic description of these processes:

> "Zirconium cladding on fuel elements is removed in an ammonium fluoride-ammonium nitrate (AFAN) solution. Ammonium fluoride reacts with the zirconium, resulting in a soluble zirconium compound. The ammonia and hydrogen evolved during decladding present a potential combustion hazard. Therefore, hydrogen is converted to ammonia by reaction with ammonium nitrate present in the AFAN solution. The dissolver solution is then processed to remove plutonium and uranium that dissolved with the cladding. Gas released from the dissolver is treated to remove iodine in a silver reactor, is acid-absorbed, and is only then released to the atmosphere. The off-gasses are treated with hydrogen peroxide to remove nitrogen oxides before being released."
>
> "Declad fuel elements are dissolved in nitric acid for the solvent extraction process. An organic solvent is used to separate the uranium, plutonium and neptunium from associated fission products and from each other. The organic solvent used in a series of extraction and stripping operations is a 30% solution of tributyl phosphate (TBP) in a normal paraffin hydrocarbon (kerosene) diluent. The first extraction cycle separates the bulk of the fission products from the plutonium, uranium and neptunium; the fission products remain in the aqueous phase. The organic phase is sent to the partitioning cycle where the plutonium is partitioned from the uranium and neptunium. The plutonium stream is routed through two additional solvent-extraction cycles for further purification. After purification, the plutonium stream is concentrated. From 1956 to 1972, the concentrated plutonium nitrate solution was sent to the plutonium finishing operations located in the 200-West Area. When the PUREX Plant resumed operations in 1983, another facility was added that produced plutonium oxide from the plutonium nitrate."
>
> "The other stream from the partition cycle, which bears the neptunium and uranium, is routed to the final uranium cycle where neptunium is separated. The aqueous neptunium stream is sent to the backcycle waste system for concentration and recycling to the solvent-extraction column. The uranium stream is routed to a column that strips the uranium from the organic stream with an aqueous nitric acid solution; concentration of the aqueous solution follows. The uranium product, uranyl nitrate hexahydrate (UNH), is then stored in tanks until it is shipped to the uranium oxide (UO_3) Plant in the 200-West Area."
>
> "A portion of the concentrated neptunium solution from the final uranium cycle is sent to the neptunium recovery and purification cycle. In this cycle, neptunium is separated from the uranium, plutonium, and the remaining fission products in the neptunium stream. This separation is accomplished by a series of extractions and ion-exchange columns. The plutonium and uranium fractions are recycled to the backcycle waste stream and partitioning cycle, respectively."
>
> "Supporting process systems include organic solvent decontamination and recovery, nitric acid recovery, and waste concentration and recovery."

2.2 LIQUID WASTE HANDLING

PUREX wastes are both chemically and radiologically contaminated but their disposition is accomplished in accordance with radiological content.

High-level wastes are stored in underground tanks while intermediate level wastes were, until 1973, routed to underground cribs for disposal. Low-level wastes such as cooling water were routed to ponds and open ditches for disposal (Smith 1980).

Typical PUREX cribs are drain field structures designed to introduce liquid wastes to soil at a point a few feet beneath the surface. Most are made up of lengths of perforated underground pipe resting in beds of sand and gravel. Heavy metals such as uranium and plutonium contained in liquid wastes tend to be filtered by the first few feet of soil and thus are effectively contained in the soils immediately beneath the cribs. Other isotopes are less effectively filtered and are drawn downward in the soil column. Hanford drawing H-2-56016 for crib 216-A-1 shows a typical example of a PUREX crib.

Some low volume, low and intermediate level, liquid wastes are disposed to the soil through french drains. These are open bottomed, gravel filled, underground encasements, usually made of concrete or tile pipe.

Trenches are commonly used for the disposal of high-volume, low-level, high-salt waste or waste containing complexed radionuclides. Many are designated "specific retention" trenches. This name comes from the fact that they were designed to be used only until they had accumulated a specific number of curies of radioactivity (Nelson 1980; Fecht et al. 1977)

There were several methods commonly used for transporting liquid waste across the Hanford Site, including ditches, underground and aboveground pipelines, and tanker trucks. Aboveground pipelines have been removed from all sites in this report. Underground lines and encasements continue to be used.

Process lines and encasements are not included in this aggregate area but are described here since they pass through the area and have been essential to the operation of PUREX and related facilities and tank farms.

Process lines, sometimes referred to on drawings as transfer lines or process sewer lines, connect the major Hanford process facilities with each other and with their waste handling facilities. Most are 3-in.-diameter stainless-steel pipe with welded joints. Those that transport high-level waste are enclosed in steel reinforced concrete encasements. All encasements in this aggregate area are below grade, some as deep as 15 ft. Hanford drawing H-2-44500 shows the location of 200 East Area process lines. Multiple sheet drawings (H-2-44501) provide greater detail and clearly identify encasements.

Encasements are concrete fixtures designed to protect from one to seven buried process lines. They vary in width, depending on the number of lines contained. The base portion is made of steel reinforced concrete that was formed and poured in place. Separate channels are sometimes provided for each process line, and the lines are raised from the encasement bottom by steel spacers. Steel plates of various design were sealed in place over the process line channels to form a water-tight seal. A steel reinforced concrete upper portion, or encasement lid, was then sealed in place to form a second water-tight seal and further protect the process lines. Riser pipes were provided to allow sampling of the interior of the encasement for contamination that might result from process line leakage. Diversion stations located at the process facilities and tank farms permit routing of process fluids to the different lines.

2.3 CHARACTER OF PUREX LIQUID WASTE

A History of the 200 Area Tank Farms (Anderson 1990) provides characterization of the liquid wastes generated by the PUREX processes.

> "At the completion of operability testing and the processing of cold uranium runs in latter 1955, PUREX Plant came on line as a production facility in January 1956. High initial waste volumes precluded self-concentration, resulting in two tanks (101-A and 102-A) being partially filled with wastes which never boiled. In May 1956, the salt waste was routed to a third Tank (103-A) and as a result of volume reductions plus temporary segregation of carbonate and organic wastes, sufficient self-heat was generated to start boiling in Tank 103-A on July 5, 1956. Boiling accelerated at a rapid rate, attaining a boiloff peak in June 1957 of 10 gal/min. When boiloff greatly exceeded input, water additions became necessary in February 1957 to maintain liquid in the tank at a reasonable level."

> "Coating waste (CW) - Aluminum-clad fuels were declad in a boiling solution of sodium nitrate by adding 50% caustic. The (waste) composition was estimated to be as follows:"

$NaAlO_2$	1.2 M
NaOH	1.0 M
$NaNO_3$	0.6 M
$NaNO_2$	0.9 M
Na_2SiO_3	0.02 M
SpG	1.19
Pu	0.4 %
U	0.4 %

> "Zircaloy-clad fuels were declad in a boiling ammonium nitrate-ammonia fluoride mixture. The resulting coating was neutralized with 50% caustic."

$ZrO_2 \cdot 2H_2O$	0.1 M
NaF	0.7 M
$NaNO_3$	0.02 M
KF	0.01 M
U	0.001 lb/gal
Pu	0.001 lb/gal
pH	10.0
SpG	1.1

> "Organic Wash Waste (OWW) - The solvent used in PUREX was treated before reuse by washing with potassium permanganate and sodium carbonate, followed by

dilute nitric acid and then a sodium carbonate wash. The organic waste streams were combined and sent to boiling waste until 1969 for boil-down. After 1969, the OWW waste was sent to a low-level waste tank in 241-C Farm."

SpG	1.02
$NaNO_3$	0.04 M
Na_2CO_3	0.13 M
MnO_2	0.004 M
U	0.0003 lb/gal

"Neutralized PUREX Plant Acid Waste (P) - The original plant in 1956 neutralized all of the high-level waste and sent it to the 241-A Tank Farm. A sugar denigration step was later used to partially neutralize the waste thereby saving tank farm space. The sugar was destroyed in the process. As fission product recovery started, a portion of the waste was treated for strontium recovery and then neutralized. As of 1967, all of the high-level waste left PUREX Plant as a acid solution for treatment at B Plant."

Fe	0.4 M
Na	1.4 M
NO_3	1.3 M
SO_4	0.9 M
PO_4	0.02 M
Al	0.15 M

"Two thorium campaigns were run; one in 1966 (1,200,000 gal), and one in 1970 (3,000,000 gal), and all of the waste was routed to Tank 104-C. This included equipment flush both before and after the runs. The operating waste amounted to about one-third of the above totals. The following composition is for approximately one third of the total volume. The remainder was flushes."

KF	0.12 M
$NaAl(OH)_2$	0.34 M
$NaNO_3$	2.57 M
KNO_3	0.014 M
Na_3PO_4	0.09 M
Fe	0.025 M
SO_4	0.05 M
NaOH	0.05 M

2.4 HANFORD RADIATION ZONES AND WARNING SIGNS

Hanford Site radiation zones are clearly marked and are commonly protected by barricades. The most common warning signs are "Surface Radioactive Contamination" and "Underground Radioactive Contamination." Detection and monitoring capabilities have evolved since the site first became operational and the meaning of warning signs and barricades have also been modified. Before 1988, barricades were required around areas where measurements exceeded 200 counts per minute (c/m). Since 1988, any area with radiation levels above detection level with portable instruments (about 50 c/m beta/gamma) have been protected with barricades. Background levels are approximately 40 c/m at the Hanford Site (Huckfeldt, Personal Communication). It should also be noted that before the early 1970's, the limit of detection was about 100 c/m and only gamma radiation was routinely measured (Mikulecky, Personal Communication).

3.0 OPERABLE UNIT 200-PO-1

Operable Unit 200-PO-1 is bounded by the Semiworks facility, the 200 East Area power plant, the PUREX tank farms, and 202-A building (Figure 1-1). The PUREX Plant is the main structure within the operable unit (Figure 3-1). It also includes four inactive cribs, two inactive burial grounds, an inactive trench, two active septic tanks, an active catch tank, and an active diversion box. The unit also contains one active and nine inactive french drains, plus 21 unplanned releases (UPR). Nearly all of these sites contain mixed waste (Table 3-1).

Seven of the UPRs consist of solid waste (Table 3-2). Only three sites, the 216-A-28 french drain, 216-A-40 trench, and the 216-A-9 crib scored over 2.0 on the environmental hazard ranking system (Table 3-2; Stenner et al. 1988). It is interesting to note that the 216-A-28 french drain was used to dispose only 30,000 L of waste, which is a relatively small volume of waste compared to other sites with comparable hazard rankings.

Table 3-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November, 1991. A list of the organic and inorganic contaminants that were part of the waste disposed in the area is given in Table 3-4. This data was extracted from the waste information data system (WIDS) (BHI 1994) and has not been validated by the authors. It should be used as a guideline only.

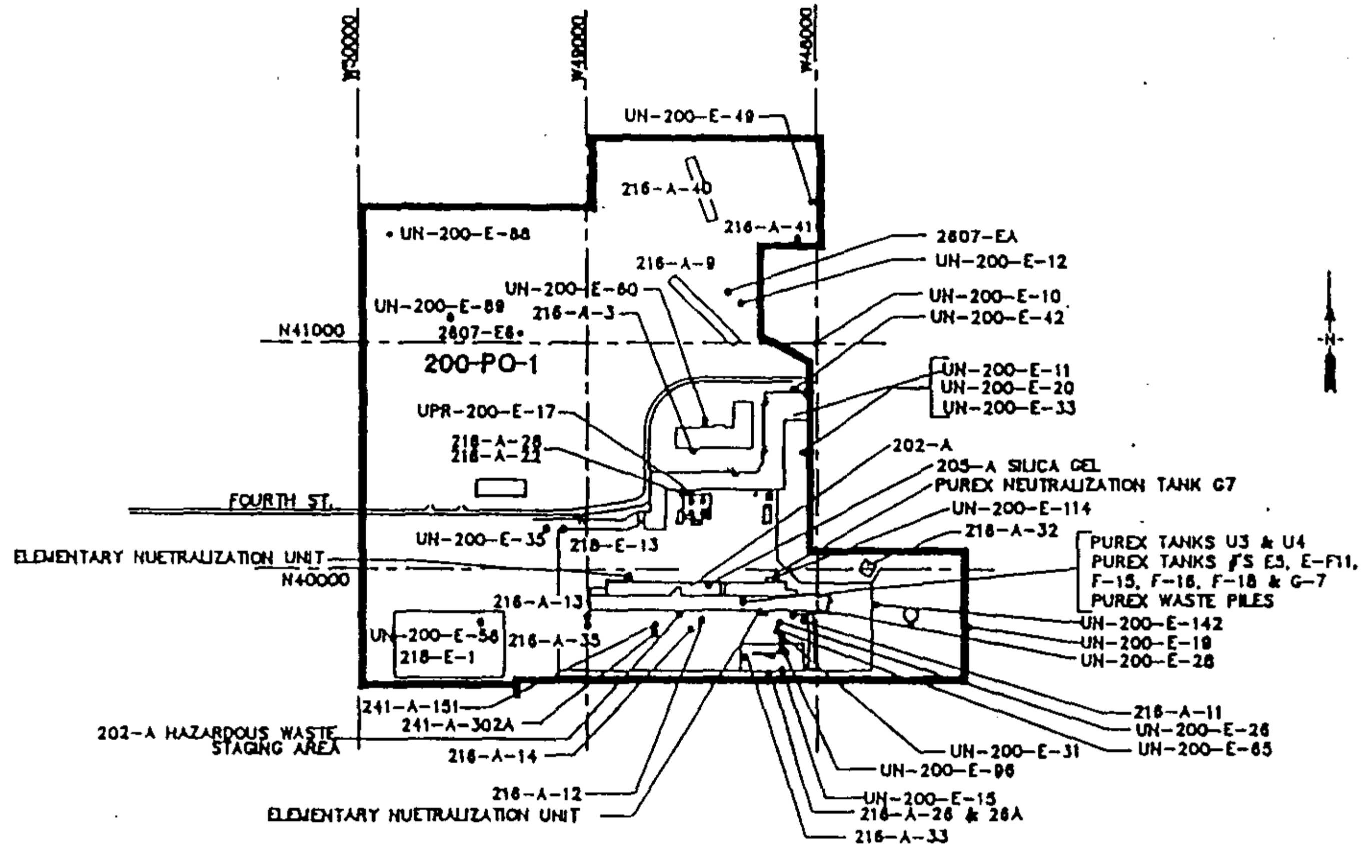
Figure 3-2 provides a graphical summary of the operational history of the individual sites. The starting and ending dates are based on data contained in BHI (1994).

3.1 216-A-3 CRIB

This unit is directly south of the 275-EA building west of Canton Avenue and 600 ft north of the 202-A building (Cramer 1987; Hanford drawing H-2-44501, Sheet 48). Until November 1967, the site received wastes from the silica gel regeneration unit in the 203-A building, the UNH storage pit drainage, and liquid wastes from the 203-A pump house (Maxfield 1979). After November 1967, the site received UNH storage pit drainage, liquid drainage, liquid waste from the 203-A building enclosure sumps, and the heating coil condensate from the P1 through P4 UNH tanks (Lundgren 1970). The above wastes are reworked through the uranium cycle and any resulting waste with low radioactivity is sent to 216-A-29. This crib received a total of 3,000,000 L of waste (BHI 1994), expected to contain the following radioisotopes: cesium-137, ruthenium-106, strontium-90 (Brown et al. 1990). The site is monitored annually. The 1990 survey did not detect contamination (BHI 1994).

3.2 216-A-9 CRIB

The 216-A-9 crib is located 500 ft west of the 241-A tank farm and 900 ft north of the 275-EA building, near 4th Street and the PUREX railway spur. Crib 216-A-9 received the acid fractionator condensate and the condenser cooling water from the 202-A building until February 1958. Between February 1958 and April 1966, and from October 1966 through August 1969, the site was inactive. From April 1966 to October 1966, the site received N reactor decontamination waste via a manhole at the site.



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JJA			1/89	1.0	
JJA			3/89	2.0	UPDATE CURRENT O.U.
JJA			1/91	3.0	INFORMATION UPDATE

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Richland, WA 99352

200 East Area
Operable Unit 200-PO-1

Figure 3-1. Location Map for Operable Unit 200-PO-1.

Table 3-1. Site Location and Waste Type Summary Table for Operable Unit 200-PO-1. (BHI 1994)

Site	Type of Site	Status	Coordinates	Type of Waste
216-A-11	French Drain	Inactive	N39780 W48050 (center)	Mixed Waste
216-A-12	French Drain	Inactive	N39780 W48503 (center)	Mixed Waste
216-A-13	French Drain	Inactive	N39814 W49010 (center)	Mixed Waste
216-A-14	French Drain	Inactive	N39742 W48551 (center)	Mixed Waste
216-A-22	French Drain	Inactive	N40330 W48560 (center)	Mixed Waste
216-A-26	French Drain	Active	N39535 W48208 (center)	Low-Level Waste
216-A-26A	French Drain	Inactive	N39550 W48208 (center)	Mixed Waste
216-A-28	French Drain	Inactive	N40340 W48575 (center)	Mixed Waste
216-A-3	Crib	Inactive	N40530 W48540 (center)	Mixed Waste
216-A-32	Crib	Inactive	N40148 W47811, N40212 W47782 (centerline)	Low-Level Waste
216-A-33	French Drain	Inactive	N39617 W48310 (center)	Low-Level Waste
216-A-35	French Drain	Inactive	N39800 W49003 (center)	Mixed Waste
216-A-40	Trench	Inactive	N41519 W48209, N41868 W48404 (centerline)	Mixed Waste
216-A-41	Crib	Inactive	N41420 W48082 (center)	Mixed Waste
216-A-9	Crib	Inactive	N41000 W48355, N41297 W48652 (centerline)	Mixed Waste
218-E-1	Burial Ground	Inactive	N39821 W49847, N39817 W49494, N39532 W49850, N39526 W49494	Pre-1970 TRU/Mixed Waste
218-E-13	Burial Ground	Inactive	N40180 W49100 (center of pit)	Mixed Waste
241-A-151	Diversion Box	Active	N39745 W48714	Mixed Waste
241-A-302A	Catch Tank	Active	N39750 W48300	Mixed Waste
2607-E6	Septic Tank	Active	N41050 W49300	Nonhazardous/Nonradioactive
2607-EA	Septic Tank	Active	N41225 W48400	Nonhazardous/Nonradioactive
UN-200-E-10	Unplanned Release	Inactive	N41000 W48000	Mixed Waste
UN-200-E-11	Unplanned Release	Inactive	N40680 W48100, N45200 W56800	Mixed Waste
UN-200-E-114	Unplanned Release	Inactive	N39930 W48470	Mixed Waste
UN-200-E-12	Unplanned Release	Inactive	N41200 W48200	Mixed Waste
UN-200-E-142	Unplanned Release	Inactive	N39850 W47740	Hazardous Waste
UN-200-E-15	Unplanned Release	Inactive	N39558 W48150	Mixed Waste
UN-200-E-19	Unplanned Release	Inactive	N39750 W47340	Mixed Waste
UN-200-E-20	Unplanned Release	Inactive	N41000 W48000	Mixed Waste
UN-200-E-26	Unplanned Release	Inactive	N39750 W48200	Mixed Waste
UN-200-E-28	Unplanned Release	Inactive	N39800 W48100	Mixed Waste
UN-200-E-31	Unplanned Release	Inactive	N39700 W48150	Mixed Waste
UN-200-E-33	Unplanned Release	Inactive	N41000 W48000	Mixed Waste
UN-200-E-35	Unplanned Release	Inactive	N40180 W49175	Mixed Waste
UN-200-E-42	Unplanned Release	Inactive	N40800 W48100	Mixed Waste
UN-200-E-49	Unplanned Release	Inactive	N41625 W48050	Mixed Waste
UN-200-E-58	Unplanned Release	Inactive	N39775 W49475	Mixed Waste
UN-200-E-60	Unplanned Release	Inactive	N40650 W48500	Mixed Waste
UN-200-E-65	Unplanned Release	Inactive	N39725 W48200	Mixed Waste
UN-200-E-88	Unplanned Release	Inactive	N41500 W49800, N40200 W49400	Mixed Waste
UN-200-E-96	Unplanned Release	Inactive	N39650 W48150	Mixed Waste
UPR-200-E-17	Unplanned Release	Inactive	N40330 W48560	Mixed Waste

Table 3-2. Operational Data and Waste Volumes for Operable Unit 200-PO-1. (BHI 1994)

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
216-A-11	Liquid	January 1956	1972		Top	0	0	30	0	100000	1.04	
216-A-12	Liquid	November 1955	1972		Top	0	0	33	0	100000	1.04	
216-A-13	Liquid	January 1956	December 1962		Top	0	0	18	0	100000	0.71	
216-A-14	Liquid	January 1956	1972		Top	0	0	29	0	1000	1.04	
216-A-22	Liquid	March 1956	December 1958		Bot	0	0	16	0	10000	1.96	UPR-200-E-17
216-A-26	Liquid	July 1965	Present		Top	0	0	0	0	0	0.00	
216-A-26A	Liquid	March 1959	July 1965		Top	0	0	15	0	1000	2.07	
216-A-28	Liquid	December 1958	November 1967		Bot	0	0	11	0	30000	47.82	
216-A-3	Liquid	January 1956	April 1981		Bot	20	20	16	360	3050000	0.00	
216-A-32	Liquid	January 1959	1972		Bot	70	8	12	0	4000	0.00	
216-A-33	Liquid	November 1955	July 1964		Top	0	0	12	0	0	0.00	
216-A-35	Liquid	December 1963	January 1966		Top	0	0	16	0	10000	1.04	
216-A-40	Liquid	January 1968	May 1979		Bot	400	20	16	0	946000	32.72	UPR-200-E-59
216-A-41	Liquid	January 1968	1974		Bot	10	10	6	0	10000	1.04	
216-A-9	Liquid	March 1956	August 1969		Bot	420	20	13	2100	981000000	57.89	
218-E-1	Solid	1945	1953		Bot	486	290	9	3000	3030	0.65	UPR-200-E-53
218-E-13	Solid	August 1966	August 1966		Top	20	15	8	184	0	0.00	
241-A-151	Liquid	1956	Present		Top	0	0	0	0	0	0.00	
241-A-302A	Liquid	1956	Present		Top	0	0	0	0	0	0.00	
2607-E6	Liquid	1954	Present		Top	0	0	0	0	0	0.00	
2607-EA	Liquid	1976	Present		Top	0	0	0	0	0	0.00	
UN-200-E-10	Solid			October 23, 1957	Top	0	0	0	0	0	0.00	
UN-200-E-11	Solid			1957	Top	0	0	0	0	0	0.00	
UN-200-E-114	Liquid			March 12, 1974	Top	0	0	0	0	0	1.04	
UN-200-E-12	Liquid			December 23, 1957	Top	0	0	0	0	0	1.04	
UN-200-E-142	Liquid			November 17, 1986	Top	0	0	0	0	76	0.00	
UN-200-E-15	Liquid			January 21, 1959	Top	0	0	0	0	0	1.09	
UN-200-E-19	Liquid			1959	Top	0	0	0	0	0	0.00	
UN-200-E-20	Solid			November 20, 1959	Top	0	0	0	0	0	0.00	
UN-200-E-26	Liquid			September 30, 1960	Top	0	0	0	0	0	0.00	
UN-200-E-28	Liquid			December 21, 1961	Top	0	0	0	0	0	0.00	
UN-200-E-31	Liquid			October 7, 1961	Top	0	0	0	0	0	1.03	
UN-200-E-33	Solid			March 20, 1964	Top	0	0	0	0	0	0.00	
UN-200-E-35	Liquid			October 1966	Top	20	15	8	0	0	0.00	
UN-200-E-42	Liquid			November 6, 1972	Top	0	0	0	0	0	0.00	
UN-200-E-49	Liquid			February 7, 1975	Top	0	0	0	0	0	0.00	
UN-200-E-58	Solid			March 4, 1980	Top	0	0	0	0	0	0.82	
UN-200-E-60	Solid			June 3, 1981	Top	0	0	0	0	0	0.00	
UN-200-E-65	Liquid			September 1, 1982	Top	0	0	0	0	0	0.00	
UN-200-E-88	Solid			September 11, 1980	Top	0	0	0	0	0	0.00	
UN-200-E-96	Liquid			September 1980	Top	0	0	0	0	0	0.00	
UPR-200-E-17	Liquid			1959	Top	0	0	0	0	0	0.00	

Table 3-3. Summary of Current Site Conditions for Operable Unit 200-PO-1. (BHI 1994)

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-A-11	Chain Link Fence	Could not determine	Could not determine	Could Not Determine	0.0	None	Inside PUREX	0	0
216-A-12	Chain Link Fence	None	None	Gravel	0.0	Brush/Grass	Inside PUREX	0	0
216-A-13	None	None	None	Gravel	0.0	None	Inside PUREX	0	0
216-A-14	None	None	None	Gravel	0.0	None	Inside PUREX	0	0
216-A-22	Light Chain	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside PUREX	0	0
216-A-26	Light Chain	Crib	Could not determine	Gravel/Soil Cover	0.0	Brush/Grass	Inside Tank Farm	0	0
216-A-26A	Light Chain	Crib	Could not determine	Gravel/Soil Cover	0.0	Brush/Grass	Inside Tank Farm	0	0
216-A-28	Light Chain	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside PUREX	0	0
216-A-3	Light Chain	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	None	None	400	400
216-A-32	Chain Link Fence	Could not determine	Could not determine	Gravel	0.0	None	Inside PUREX	0	0
216-A-33	None	Could not determine	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-A-35	None	Limit. Access/Conf. Space	None	None/Unknown	0.0	None	None	0	0
216-A-40	Remesh Fence	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	None	41965	41965
216-A-41	None	None	None	None/Unknown	0.0	None	None	0	400
216-A-9	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	None/Unknown	0.0	Brush/Grass	None	17248	17248
218-E-1	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	1.0	Brush/Grass	None	0	0
218-E-13	None	None	None	None/Unknown	0.0	None	Inside PUREX	0	0
241-A-151	Chain Link Fence	Could not determine	Could not determine	None/Unknown	0.0	None	Inside PUREX	0	0
241-A-302A	Chain Link Fence	Could not determine	Could not determine	None/Unknown	0.0	None	Inside PUREX	0	0
2607-E6	Wood Posts	Sani. Sewer Drainfield	Wood Post with Plaque	None/Unknown	0.0	Brush/Grass	None	0	0
2607-EA	Light Chain	Sani. Sewer Drainfield	Wood Post with Plaque	Gravel/Soil Cover	0.0	None	None	0	0
UN-200-E-10	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	Inside PUREX	0	0
UN-200-E-11	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-114	None	None	None	Gravel/Soil Cover	0.0	None	Inside PUREX	0	0
UN-200-E-12	None	None	None	None/Unknown	0.0	None	None	23976	23976
UN-200-E-142	Chain Link Fence	None	None	None/Unknown	0.0	None	Inside PUREX	0	0
UN-200-E-15	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-19	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	None	0	0
UN-200-E-20	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-26	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-28	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-31	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-33	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	None	0	200376
UN-200-E-35	None	None	None	None/Unknown	0.0	None	Inside PUREX	0	0
UN-200-E-42	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-E-49	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-E-58	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-60	None	None	None	None/Unknown	0.0	None	Inside PUREX	0	0
UN-200-E-65	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-88	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-96	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UPR-200-E-17	Light Chain	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside PUREX	0	930325

Table 3-4. Summary of Organic and Inorganic Contaminants in Operable Unit 200-PO-1.
(BHI 1994)

Site	Fluoride (kg)	FeCN (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	Na Al (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-A-11	0	0	0	0	0	0	0	0	0	0	0	100	0	0
216-A-12	0	0	0	0	0	0	0	0	0	0	0	100	0	0
216-A-13	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-14	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-22	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-26A	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-28	0	0	0	0	0	0	0	0	0	0	0	300	0	0
216-A-35	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-40	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-41	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-9	0	0	0	0	0	0	0	0	0	0	0	300000	0	0

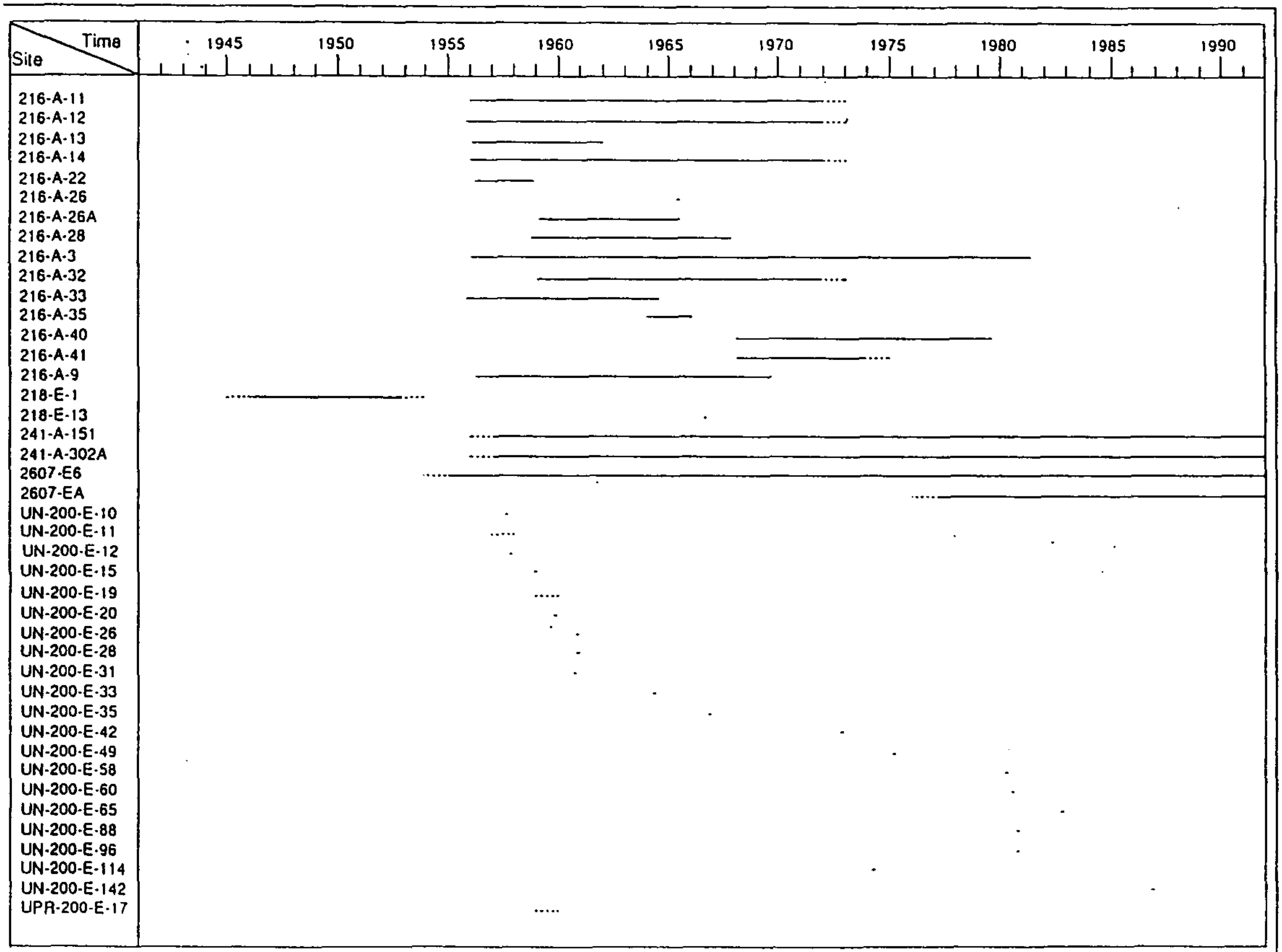


Figure 3-2. Summary of Operational Periods for Operable Unit 200-PO-1.

In August 1969, the site received the acid fractionator condensate from the 202-A building. The site has received a total of 981,000,000 L of waste containing: cesium-137, ruthenium-106 and-strontium-90 (Brown et al. 1990; Stenner et al. 1988).

The crib was abandoned in February 1958 because the condenser flow had surpassed the capacity of the crib. The crib was deactivated by blanking the effluent pipeline to the unit after replacing 100 ft of the pipeline that had failed. The effluents were rerouted to the 216-A-29 ditch via the 202-A building chemical sewer (Lundgren 1970).

Wells 299-E24-3, 299-E24-4, 299-E24-5, and 299-E24-63 monitor this location, and indicate that breakthrough to groundwater has not occurred at this site (Fecht et al. 1977). Elevated radiation levels were detected in wells 299-E24-3 and 299-E24-4 in 1963. By 1976, the radiation level was near background (Fecht et al. 1977). The April 1990 surface radiological survey found one spot with a level of 30,000 dis/min. This represented an increase from the 1989 surface survey.

The site is easily accessed and well posted. A valve station is located on the west side and consists of a small concrete pad with protruding, stubbed pipes. The pipes have internal contamination labels affixed, and the entire station is surrounded by light chain barriers with underground contamination placards (site visit by authors, 1991).

3.3 216-A-11 FRENCH DRAIN

French drain 216-A-11 is 2.5 ft in diameter and located at the southeast corner of the 202-A building (Maxfield 1979). Two reinforced concrete pipes, 6 ft in length, have been placed vertically, end to end in a 10-ft-diameter excavation that extends 5 ft below the bottom of the pipe. The site received 100,000 L of low-salt neutral drainage from trap pit #1 in the 202-A building. The site is expected to contain less than 50 Ci total beta activity (Stenner et al. 1988). The 1990 radiological survey did not identify any surface contamination (environmental protection hardfiles). An identification post is the only visible surface manifestation of this site (site visit by authors, 1991).

3.4 261-A-12 FRENCH DRAIN

Approximately 100,000 L of low-salt drainage from trap pit #3 in the 202-A building was discharged to this unit. The 216-A-12 french drain is located about 75 ft south, and near the center of the 202-A building (Maxfield 1979). It is identical in construction to 261-A-11, consisting of two vertical reinforced concrete pipes placed end to end in a 10-ft-diameter excavation that extends 5 ft below the bottom of the pipe. Both the drain and excavation are filled with gravel (Hanford drawing H-2-55090). The total beta activity is expected to be less than 50 Ci (Stenner et al. 1988).

3.5 216-A-13 FRENCH DRAIN

Located at the west end of the 202-A building the site received about 100,000 L of seal water from the air sampler vacuum pumps in the 202-A building (Maxfield 1979). The drain is constructed of two lengths of a 3-ft-diameter concrete pipe placed vertically end-to-end, and filled with 2-in. to 3-in.-diameter gravel. The base of the drain was over excavated by at least 1 ft in all directions and the annulus was backfilled with gravel (Hanford drawing SK-2-2568).

The site is expected to contain less than 1 Ci total beta activity; however, the base of the drain is in common with the underground radiation zone associated with the 216-A-35 french drain. The drain was deactivated when the effluent flow rate exceeded the infiltration capacity (Stenner et al. 1988). The 1990 radiological survey did not identify any surface contamination (environmental protection hardfiles). There is no identification post at this site (site visit by author, 1991).

3.6 216-A-14 FRENCH DRAIN

This unit is about 75 ft east of the 216-A-13 site, on the south side of the 202-A building (Maxfield 1979). Only 1,000 L of vacuum cleaner filter and blower pit drainage from the 202-A building was discharged to this unit, which is a low-salt, neutral to basic pH waste. It is expected to contain about 1 Ci total beta activity (Stenner et al. 1988). It is identical in construction to the 216-A-11 and 216-A-12 french drains, consisting of two vertical reinforced concrete pipes placed end to end in a 10-ft-diameter excavation that extends 5 ft below the bottom of the pipe. Both the drain and excavation are filled with gravel (Hanford drawing H-2-55090).

The 1990 radiological survey identified spots of 56,000 dis/min (alpha) and 20,000 dis/min (beta) direct contamination. Smearable contamination of 700 dis/min (alpha) was also detected (environmental protection hardfiles).

3.7 216-A-22 FRENCH DRAIN/UPR-200-E-17

The 216-A-22 french drain is approximately 400 ft north of the 202-A building, near the 216-A-28 french drain (Maxfield 1979). Approximately 10,000 L of drainage from the 203-A building truck layout apron, sump waste from the 203-A building enclosure, and the heating coil condensate from the P-1 through P-4 UNH tanks was discharged to this drain. It is anticipated that less than 1 Ci total beta activity is present (Stenner et al. 1988). The 1988 radiological survey did not identify any surface contamination (BHI 1994).

This french drain has one UPR associated with it (UPR-200-E-17). The release occurred when a crib inlet failed and contaminated the soil on top of the crib (Stenner et al. 1988). There is no mention of the waste type or amount deposited during the spill.

The unit was deactivated by closing the valve to the drain (Wilson 1982). The drain was backfilled to grade when constructed. Access to the drain was by two subsurface feeder pipes. There are no surface indications of this drain (BHI 1994; site visit by authors, 1991).

3.8 216-A-26 FRENCH DRAIN

French drain 216-A-26, which is also identified as 216-A-26B (BHI 1994), was constructed approximately 115 ft south of the center of the 202-A building, and about 15 ft south of the 216-A-26A french drain. The drain consists of a buried 5-ft by 36-in.-diameter clay pipe filled with gravel, accessed by a subsurface feeder pipe (BHI 1994). This site has been receiving floor drainage from the 291-A fan control house, and contains less than 1 Ci total beta activity (Maxfield 1979). French drain 216-A-26A was replaced by this unit (BHI 1994). The 1990 radiological survey did not identify any surface contamination (environmental protection hardfiles).

The 216-A-26 french drain is enclosed within the surface contaminated zone that blocks the east half of the PUREX security compound. This site, and site 216-A-26A, could not be differentiated from the perimeter of the contaminated zone.

3.9 216-A-26A FRENCH DRAIN

French drain 216-A-26A is located about 100 ft south of the center of the 291-A building (Maxfield 1979). The construction design of this unit is identical to drain 216-A-26. Floor drainage (1,000 L) from the 291-A fan control room, thought to have less than 1 Ci total beta activity, was discharged to the drain (Stenner et al. 1988). The 1990 radiological survey did not identify any surface contamination (environmental protection hardfiles).

The drain was deactivated by removing the encasement and rerouting the effluent piping to the new 216-A-26B french drain encasement (Maxfield 1979). This site and 216-A-26 could not be distinguished from each other in the field (site visit by authors, 1991).

3.10 216-A-28 FRENCH DRAIN

This site is approximately 500 ft north of the 202-A building and about 1,250 ft west of Canton Avenue (Maxfield 1979). The unit received 30,000 L of liquid waste from the 203-A building enclosure sumps and the heating coil condensate from P1 through P4 UNH tanks (Stenner et al. 1988).

When the effluent flow rate exceeded the infiltration capacity, the unit was deactivated by blanking the incoming effluent pipeline. The effluent was then rerouted to the 216-A-3 crib (Lundgren 1970).

In 1981, the center of the unit was excavated and disposed of before installation of a PUREX security system. After the security system was installed and the site backfilled to grade, no posting or identification marker were placed at the site (BHI 1994). Currently, the drain is inside a posted surface contamination area immediately north of the UNH tanks and south of the security fence (site visit by authors, 1991). The 1988 survey did not identify any contamination at this site (BHI 1994). During the 1990 radiological survey, direct readings of 10,000 dis/min (beta-gamma) and 580 dis/min (alpha) were observed on the piping. Contaminated paint chips reading 10,000 dis/min (beta-gamma) and 2,300 dis/min (alpha) were also identified (Environmental Assurance Hardfiles).

3.11 216-A-32 CRIB

Approximately 4,000 L of 202-A building crane maintenance facility floor, sink, and shower drainage were discharged to the 216-A-32 crib (Stenner et al. 1988). The site, which is located about 300 ft northeast of the 202-A building and about 700 ft west of Canton Avenue, is expected to contain about 1 Ci of total beta activity (Maxfield 1979). This crib contains 77.5 ft of 6-in.-perforated vitrified clay pipe (VCP), placed 5 ft below grade, surrounded by gravel (BHI 1994). In a letter (Walsar 1966), Isochem Corporation clearly indicates the intent to dispose 65,000 gal of approximately 50% Soltrol (a brand of purified kerosene [Raol 1991])) diluent in this crib.

The authors were unable to identify if the proposed disposal took place. The crib is located within the PUREX security zone and the PUREX surface contaminated area. Therefore, the authors were unable to examine the site closely during a field inspection (site visit by authors, 1991). A radiological survey conducted in 1990 failed to identify any contamination at this site (Environmental Assurance Hardfiles).

3.12 216-A-33 FRENCH DRAIN

French drain 216-A-33 is located approximately 300 ft south of the 202-A building and 1,100 ft west of Canton Avenue, near the southwest corner of the 291-A building (Maxfield 1979). Unfortunately, this drain is located inside the PUREX surface contaminated area and could not be closely inspected by the authors (site visit by authors, 1991).

The site was designed to receive bearing cooling waste from the 291-A-1 stack electrical exhaust fans; however, no coolant was ever used. Therefore, no waste was discharged to this unit (Stenner et al. 1988). The site was deactivated by capping the effluent pipeline to the unit on the south side of the 291-A fan plenum (Lundgren 1970). The 1990 survey did not find any contamination at this site (Environmental Assurance Hardfiles).

3.13 216-A-35 FRENCH DRAIN

This unit is at the west end of the 202-A building near the 216-A-8 crib (Maxfield 1979). More than 10,000 L of seal cooling water from the air sampler vacuum pumps in the 202-A building were discharged to this unit. The waste is expected to be low salt, and contain less than 1 Ci total beta activity (Stenner et al. 1988). A radiation survey conducted in 1990 failed to identify contamination at this site (Environmental Assurance Hardfiles).

The site was deactivated by capping the effluent pipeline to the unit and rerouting the effluent to the 216-A-29 ditch via the 202-A building chemical sewer (Lundgren 1970). This french drain was built to replace the 216-A-13 french drain (Stenner et al. 1988). The drain is marked by a large diameter yellow concrete pipe with a "confined space" warning posted. There were no identification posts (site visit by authors, 1991). It is assumed to be in the same radiological unit as site 216-A-13 (BHI 1994).

3.14 216-A-40 TRENCH/UPR-200-E-59

This large trench is located about 500 ft west of the 241-AX tank farm and 500 ft south of 7th Avenue (Maxfield 1979). This site received 946,000 L of diverted cooling water and steam condensate from the 244-AR vault (Stenner et al. 1988). The design of this trench is somewhat unique in that it has a rubber bag type diverter for the recovery of radioactive cooling water that might become contaminated from equipment failure (Maxfield 1979). The site was taken out of service because of a leak in the bag liner (Stenner et al. 1988). The April 1990 annual surveillance survey detected gross surface contamination up to 3.5 mrem/h (Huckfeldt 1990).

One UPR is associated with this unit (UPR-200-E-59). Contaminated mud and tumbleweeds from 216-A-40 were used by swallows to build nests on the 244-AR vault (BHI 1994). The nests were removed and the ditch was cleared of tumbleweeds and mud (Stenner et al. 1988). Currently, the ditch is enclosed within a box-wire fence. Numerous tumbleweeds fill the ditch bottom (site visit by authors, 1991).

3.15 216-A-41 CRIB

Crib 216-A-41 is located about 100 ft west of the 241-AX tank farm and about 600 ft south of 7th Avenue (Maxfield 1979). The site received 10,000 L of drainage from the 296-A-13 stack. The waste is slightly acidic and is expected to contain less than 1 Ci total beta activity (Stenner et al. 1988). The crib structure consists of six 8-in. by 8-in. concrete blocks placed end to end instead of the usual 4+ in. VCP, as a dispersion structure (BHI 1994).

This unit was closed by removing the stack drainage pipe from the 296-A-13 stack. The stack drainage was then rerouted to the 244-AR building (Maxfield 1979).

The authors have not been able to establish the exact location of this crib in the field. Several temporary buildings are located in the vicinity of the crib at the present time (site visit by authors, 1991). Hanford photographs 122440-182-CN and 122440-183-CN suggest that the crib is located south of the steam line that separates the 296-A-13 stack and the temporary buildings located to the north.

3.16 218-E-1 BURIAL GROUND/UPR-200-E-53

Burial ground 218-E-1 is a 3 acre dry waste burial ground located approximately 350 ft west of the 202-A building (Maxfield 1979). The burial ground consists of 15, 700-ft-long trenches running north-south, ranging from 16 to 20 ft wide (BHI 1994). This burial ground received about 3,030 m^3 of both mixed fission products and transuranic dry waste (Stenner et al. 1988). This waste is expected to contain cesium-137, ruthenium-106, and strontium-90 (Anderson et al. 1991).

The site was initially stabilized in 1974 when all surface depressions were filled to grade with cinders from the 200 East Area power plant and the cinders covered with gravel. In October 1981, the entire surface of the unit was covered with a minimum of 18 in. of clean overburden and revegetated (SD-RE-PRS-001). The 1990 annual radiological survey identified weeds in the southeast corner of the site that were contaminated to a level of 5,000 c/m (BHI 1994).

This site has a UPR associated with it (UPR-200-E-53). The release occurred during a burial operation when contamination was spread by uncovering previously buried waste at the south end of a waste trench in the 218-E-1 burial ground. The release had unknown beta/gamma contamination with readings to 150 mR/h (Stenner et al. 1988). At the present time there are no signs indicative of a UPR (site visit by authors, 1991).

3.17 218-E-13 BURIAL GROUND

The site is located about 350 ft west of the PUREX exclusion area patrol gate house on 4th Street (Maxfield 1979). This unit was unplanned and has an area of 170 m^2. It received broken pieces of contaminated concrete from a pipe trench, which were left in the excavation hole and buried following repair to the piping at the location (Stenner et al. 1988). The site contains less than 1 Ci total beta activity (Maxfield 1979).

The area where the site is shown on Hanford drawing H-2-44501, Sheet 48, is a gravel road with no surface markings or manifestations of a disposal site in the area (site visit by authors, 1991). Hanford photograph 122440-207-CN suggests the site lies between the inner and outer PUREX security fences.

3.18 241-A-151 DIVERSION BOX

Diversion box 241-A-151 is located about 50 ft south of the east end of the 202-A building (Maxfield 1979). It is within the PUREX surface contaminated area, therefore the authors were unable to examine it closely (site visit by authors, 1991). The site is still active and transports solutions from processing and decontamination operations in the 202-A building to valve pits 241-A-A and 241-A-B. Quantities are variable depending on specific plant operations (Cramer 1987). There are additional lines linked to diversion box 241-A-152, but these are blanked (BHI 1994; Figure 3-3).

This diversion box has two UPRs associated with it (UN-200-E-26 and UN-200-E-65) that are discussed in Sections 3.28 and 3.37, respectively. A surface radiological survey performed in 1988 did not identify any areas of contamination at this site (BHI 1994).

3.19 241-A-302A CATCH TANK

This tank is located near the 241-A-151 diversion box, immediately south of the 202-A building. This unit is still active and is used for transfer of waste solutions from processing and decontamination operations in the 202-A building, and currently holds about 3,605 gal of waste (BHI 1994). It is designed to contain leaks from transfers, and drainage from operations within the diversion box (Cramer 1987). Like diversion box 241-A-151, this site is within the PUREX surface contaminated area, therefore the authors were unable to examine it closely (site visit by authors, 1991).

3.20 2607-EA SEPTIC TANK

This tank is located west of the 241-A tank farm, approximately 500 ft north of 4th Street, and immediately south of the 244-AR vault building. This septic tank and drain field are still active and accept wastewater and sewage at the rate of 0.06 m^3/d (Cramer 1987). The open area of the drain field is very small (site visit by authors, 1991).

3.21 2607-E6 SEPTIC TANK

Septic tank 2607-E6 is located north of the MO-405 building, approximately 300 ft west and 700 ft north of 4th Street. The drain field is surrounded by a wooden fence and the surface is vegetated with brush and at grade (site visit by authors, 1991). Currently, sanitary wastewater and sewage are discharged to this tank and drain field at the rate of 43.5 m^3/d (Cramer 1987).

3.22 UN-200-E-10 UNPLANNED RELEASE

This UPR occurred on October 23, 1957, at the PUREX railroad right-of-way. PUREX tube bundles in transit to a burial ground spread contamination to the ground, requiring extensive decontamination (Stenner et al. 1988). The coordinates of this release listed in BHI (1994) suggest that the release occurred within the surface contaminated area inside the PUREX security fence (site visit by authors, 1991).

3.23 UN-200-E-11 UNPLANNED RELEASE

In 1957, fission product contamination spots dripped along the railroad sidings from the PUREX Plant tunnel to the 218-E-5 burial ground and the "TC" spur. Most of the contamination was removed. The tracks were marked with stakes and radiation zone signs on either side of the tracks (Stenner et al. 1988). Outside the PUREX fence, the railway line is not marked or barricaded. The rail line inside the fence is within the surface contaminated area of PUREX (site visit by authors, 1991).

3.24 UN-200-E-12 UNPLANNED RELEASE

This UPR occurred on December 23, 1957, at the PUREX railroad bed and right-of-way, north of the 216-A-9 crib. A burial box in transit from PUREX measuring 450 mR/h at 150 ft dripped liquid while in transit, resulting in 40 to 1,700 mR/h contamination (Stenner et al. 1988). The railway line in this area is not marked or barricaded (site visit by authors, 1991).

3.25 UN-200-E-15 UNPLANNED RELEASE

On January 21, 1959, on the paved area outside of the 291-A turbine house this UPR occurred when the 216-A-4 crib became plugged during the jetting of the 216-A catch tank. The ground became contaminated with unknown beta/gamma with readings up to 8 R/h (Stenner et al. 1988). The area of this release is located inside the PUREX surface contaminated area. It is paved with asphalt or gravel (site visit by authors, 1991).

3.26 UN-200-E-19 UNPLANNED RELEASE

This UPR occurred in 1959, 600 ft east of the 202-A building. Low-level fission product contamination has seeped into the ground from moisture escaping the vent pipe bonnet at the A-6 proportional sample pit (Stenner et al. 1988). The area is marked with stakes, chain, and radiation zone warning signs (site visit by authors, 1991).

3.27 UN-200-E-20 UNPLANNED RELEASE

On November 20, 1959, a spill (UN-200-E-20) occurred at the PUREX railroad right-of-way. During transit of two tube bundles from PUREX the right-of-way became contaminated with readings up to 3 R/h at 18 in. (Stenner et al. 1988). Site coordinates listed in BHI (1994) suggest the release occurred north of the PUREX security fence, where the railway is not marked (site visit by authors, 1991).

3.28 UN-200-E-26 UNPLANNED RELEASE

This UPR occurred on September 20, 1960, south of the 241-A-151 diversion box outside of the 200 East Area perimeter fence. The contamination also crossed Route 4S. The diversion box is included within the PUREX surface contaminated area, outside of the PUREX fence. Leakage from the 241-A-151 diversion box caused an operator to stop transfer, but the process tank emptied and steam blew out the jumper connection, with unknown beta/gamma with readings from 1 to 3 mR/h near the diversion box and just outside the exclusion fence. General contamination was up to 3,000 c/m (Stenner et al. 1988).

The diversion box is located inside of the PUREX surface contaminated area. A surface contaminated enclosure was found south of the PUREX exclusion zone, but it is probably not due to this UPR (see Section 4.4).

3.29 UN-200-E-28 UNPLANNED RELEASE

This UPR occurred December 21, 1961, in the eastern half of the PUREX exclusion area, which is within the PUREX surface contaminated area. Fission products escaped from a trap pit upon failure of a process vessel steam coil and trap pit piping (Stenner et al. 1988).

3.30 UN-200-E-31 UNPLANNED RELEASE

On October 7, 1961, the 241-A-151 diversion box was opened and the steam that was present escaped to the air. Contamination spread over the PUREX exclusion area and eastward to the west bank of the Columbia River. The contamination consisted of unknown beta/gamma with readings from 40,000 to 100,000 c/m inside the PUREX fence, and were an order of magnitude lower and decreased to 1,000 c/m outside the fence (Stenner et al. 1988). A large area southeast of PUREX is now barricaded and posted with surface contamination placards. The area is bounded by 218-E-14 on the west, Canton Avenue on the east, building 295-AD on the north, and ends approximately 100 ft south of exclusion zone fence along the 218-E-14 tunnel (site visit by authors, 1991).

Documentation contained in the environmental protection hardfiles suggests that the area is called UN-216-E-34, which has no UN-200 series cross reference. The 1991 radiological survey showed the site to be below the detection limit, while the 1990 survey identified spots of contamination up to 3,000 dis/min (environmental protection hardfiles). This suggests that the level of contamination at the site is decreasing.

3.31 UN-200-E-33 UNPLANNED RELEASE

This spill occurred on March 20, 1964, at the railroad right-of-way from PUREX to the 200 East Area burial ground. A leaking tube bundle burial box in transit to the burial ground contaminated a portion of the railroad right-of-way and area adjacent to the 216-A-9 crib. The site surface was stabilized in 1981 (Stenner et al. 1988). At the present time only the railway line inside the inner PUREX security fence is posted with surface contamination warning signs. The railway near the 216-A-9 crib is not marked (site visit by authors, 1991).

3.32 UN-200-E-35 UNPLANNED RELEASE

This site is a duplicate of 218-E-13 (Section 3.17) and is scheduled for deletion.

3.33 UN-200-E-42 UNPLANNED RELEASE

This UPR was detected on November 6, 1972, on the dirt bank east of the 241-AX-151 diversion station and in weeds east of the established parking lot. It was surmised that a jet was left on in the 244-AR building resulting in pressurizing of a diverter tank at the 241-AX-151 diversion box and spread of contamination. There was unknown beta/gamma with readings of 300 to 3,000 c/m (Stenner et al. 1988). Currently, there are no barriers or markers for this release (site visit by authors, 1991).

3.34 UN-200-E-49 UNPLANNED RELEASE

On February 7, 1975, a thermocouple well being transferred from 241-A-104 to burial ground 218-E-12B contaminated a section of the road northwest of the 241-AY tank farm and northeast of the 241-C tank farm (BHI 1994). Contamination with unknown beta/gamma with readings of 100,000 c/m was confined to the snow cover and did not reach the ground surface. The affected sections of road were barricaded and the contamination was removed (Stenner et al. 1988). No markers could be found along the road to indicate the area where the release occurred (site visit by authors, 1991).

3.35 UN-200-E-58 UNPLANNED RELEASE

On March 4, 1980, Radiation Monitoring detected a high background on the dirt road to the 218-E-1 dry waste burial ground from the 241-BX tank farm. A follow-up survey revealed bits and pieces of a crushed tumbleweed spread over approximately 75 ft of roadway. Maximum radiation readings on the weed bits was 100,000 c/m with unknown beta/gamma. The roadway was cleaned up (Stenner et al. 1988). Currently, there are no markers or barricades along the roadways leading to or surrounding the site (site visit by authors, 1991).

3.36 UN-200-E-60 UNPLANNED RELEASE

On June 3, 1981, an overfilled dump truck hauling contaminated dirt to the burial ground inadvertently spilled dirt in an area from 1 to 2 ft wide and 40 ft long on the roadway near 275-EA. Radioactive contamination with unknown beta/gamma reading from 200 to 500 c/m was found on the road. The roadway was decontaminated to background readings (Cramer 1987). The roadway in the area of the spill is not marked and there are no visible signs of the spill (site visit by authors, 1991).

3.37 UN-200-E-65 UNPLANNED RELEASE

On September 1, 1982, during the removal of jumpers for burial from the 241-A-151 diversion box, a gust of wind blew across the open diversion box resulting in a spread of contamination to the immediate ground surrounding the box and to a point 70 ft to the west (Cramer 1987).

Contamination levels of 10,000 c/m were detected on the crane, 3,000 c/m on a steam line, 5,000 c/m on the roof of a nearby metal shed and numerous spots from 600 to 5,000 c/m were detected on the ground. The ground contamination was kept wet until it could be decontaminated to background radiation levels and stabilized. The diversion box covers were sprayed with fabri-film, which is used to fix physical contamination to a solid surface (Cramer 1987). This UPR occurred within the zone that is now barricaded and posted as a surface contamination area within the PUREX exclusion zone.

3.38 UN-200-E-88 UNPLANNED RELEASE

This release occurred about 900 ft northwest of the 202-A building at the TC-4 railroad spur. This large radiation zone associated with the TC-4 spur has been incorrectly designated as a UPR site. The original perimeter of the zone was located where gamma dose rates from radioactive equipment parked on the spur would be less than 1 mR/h. The site in question was properly known as a regulated equipment storage area (Maxfield 1981).

The date that this condition first existed is unknown. It was officially established as a site in September 1980 (BHI 1994). In late 1980, the ground surface of the zone was surveyed and found free of contamination except for a few specks of residual contamination in the gravel of the railroad bed. The radiation zone perimeter fence was then moved to within 20 ft of each side of the track and parallel to the tracks down to where the spur joins the main line (Maxfield 1981). The site was stabilized, but contamination to 30,000 c/m on the ground surface has returned (BHI 1994).

Currently, the spur is divided into two zones. The spur is stubbed, approximately 60 ft north of the MO-405 building, west of PUREX. The railway is blocked with a light chain barricade, posted with surface contamination placards, to a distance of approximately 200 ft south of the spur-main line juncture. Several yellow radiation warning flags can be seen on the roadbed (site visit by authors, 1991). From this point until approximately 60 ft south of the juncture, a 6-ft-high chain link fence encloses an area where tank cars are held. Surface contamination and high radiation area placards are posted on the fence. Two large metal boxes and four tank cars were present during a recent site visit by the authors. A new light chain barrier, with surface contamination warning signs, was present on the west side of the chain link enclosure. This barrier is set up on temporary posts.

Surface radiological surveys performed in 1991 identified contamination of 20,000 to 60,000 dis/min on the railway near the tank cars. South of the tank cars, along the railway, contaminated areas of 2,000 to 20,000 dis/min were also identified (environmental protection hardfiles).

3.39 UN-200-E-96 UNPLANNED RELEASE

This site originated from the residue contamination from the PUREX 291-A stack and diversion box work during the years of PUREX Plant operation. The site is located on the south side of the 202-A building to the southern fence and was detected in September 1980 (Stenner et al. 1988).

The area was covered with 4 to 6 in. of crushed gravel and the surface contamination warning signs have been removed. However, this area has been re-contaminated following the restart of PUREX (Stenner et al. 1988). It is enclosed with the surface contaminated area inside the PUREX compound. The area is covered with gravel or paved with asphalt (site visit by authors, 1991).

3.40 UN-200-E-114 UNPLANNED RELEASE

This UPR occurred on March 12, 1974, at a valve pit outside the 202-A building. An employee had been working in an area where contamination with readings of 8,000 c/m beta and 1,000 c/m alpha were detected. Upon being surveyed, the employee was also found contaminated at the same levels (Stenner et al. 1988).

During a site visit by the authors, no barrier or signs marking the spill were found. The area north of the 202-A building contains numerous tanks and pipes and is currently paved with asphalt or covered with gravel (site visit by authors, 1991).

3.41 UN-200-E-142 UNPLANNED RELEASE

On November 17, 1986, 75.7 L of contaminated diesel fuel overflowed from the tank of a diesel compressor during refueling. The release was absorbed, cleaned and drummed up for disposal (Cramer 1987). The coordinates for this UPR, given in BHI (1994), correspond to the security zone east of the 202-A building. During a site visit by the authors no tank was observed and no markers were posted to indicate the spill. A small diesel tank in a concrete catch basin on the north side of PUREX was observed; however, there were no indications of a release around it (site visit by authors, 1991).

4.0 OPERABLE UNIT 200-PO-2

The second operable unit of the PUREX Aggregate Area is 200-PO-2, located in the southeast corner of the 200 East Area, south of Operable Unit 200-PO-1 (Figures 1-1 and 4-1). Figure 4-2 provides a graphical summary of the operational history of the individual sites. Table 4-1 provides site locations and waste types for Operable Unit 200-PO-2. The starting and stopping dates are based on data contained in BHI (1994) and listed in Table 4-2.

One active crib, 10 inactive cribs, one inactive french drain, one inactive injection well, and eight UPRs constitute the waste sites that comprise this operable unit (Table 4-1). The injection well and the active crib, 216-A-45, contain low-level wastes, all the other sites contain mixed waste, except for crib 216-A-38-1, which was constructed but never used (Table 4-1). Five cribs scored over 45 on Battelle's Hazard Ranking System (Table 4-2; Stenner et al. 1988). Note that the 216-A-10 crib was not evaluated or included in the hazard migration report (Stenner et al. 1988).

Table 4-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November 1991. A list of the organic and inorganic contaminants that were part of the waste disposed in the area is given in Table 4-4. This data was extracted from BHI (1994) and has not been validated by the authors. It should be used as a guideline only.

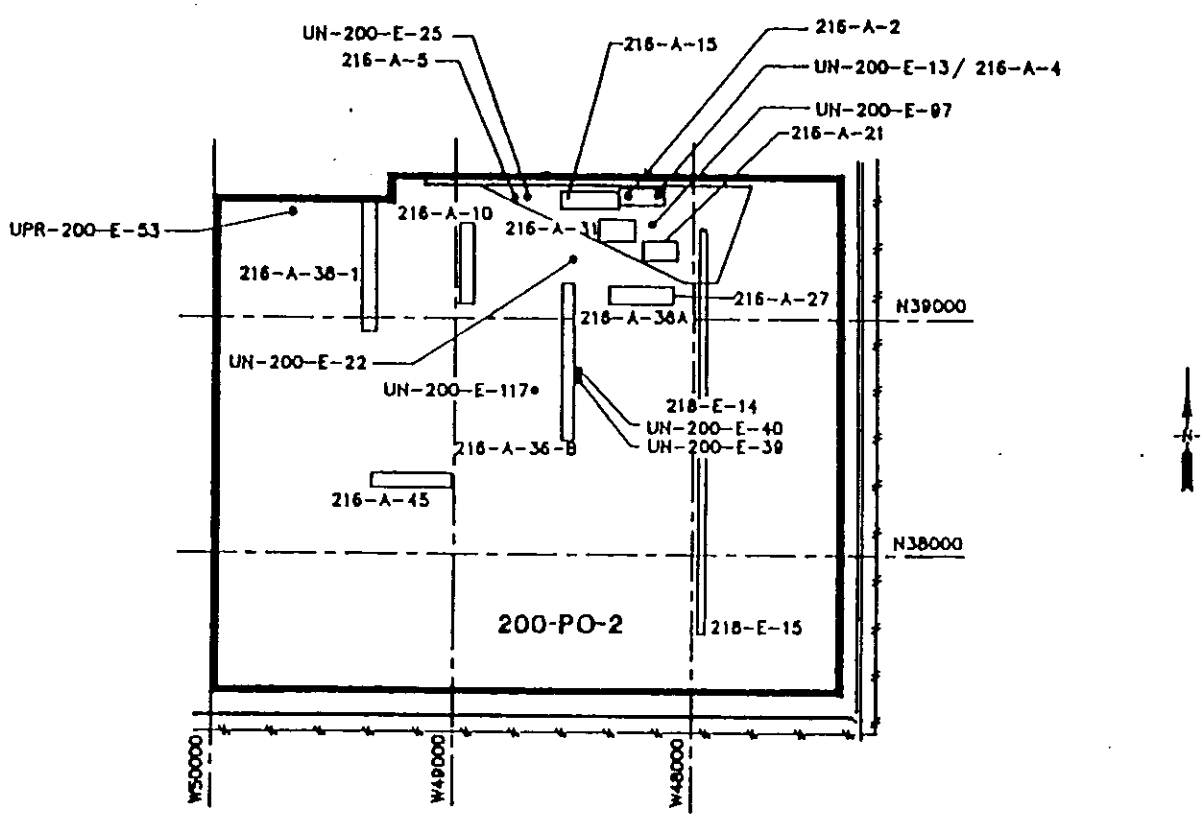
4.1 216-A-2 CRIB

This crib is located about 260 ft south of the 202-A building and 900 ft west of Canton Avenue, southwest of the 291-A-1 stack. It is located inside the PUREX surface contamination area and could only be inspected from a distance by the authors (site visit by authors, 1991). The area is covered with gravel and the crib is marked by a light chain barrier and a stubbed green pipe. The 1990 radiological survey did not identify any areas of contamination at this site (environmental protection hardfiles).

Approximately 230,000 L of organic wastes, containing normal paraffin hydrocarbons and TBP, from the 202-A building were discharged to this unit (Stenner et al. 1988). The radioisotopes thought to be present are cesium-137, ruthenium-106, and strontium-90. The site was deactivated by removing a section of effluent piping when the specific retention capacity was reached (Maxfield 1979). This unit is a registered underground injection well (DOE-RL 1988).

4.2 216-A-4 CRIB

This site is located 260 ft south of the 202-A building and just east of the 216-A-2 crib (Maxfield 1979). The crib received 6,210,000 L of laboratory cell drainage from the 202-A building and the 291-A-1 stack drainage (Stenner et al. 1988). The radioisotopes thought to be present are cesium-137, ruthenium-106, and strontium-90. In December 1958, the unit plugged and flooded an area between the unit and the 291-A-1 stack, contaminating the ground. The contamination was removed to a trench along the south boundary of the unit and covered with 1 ft of soil (Baldridge 1959). No surface contamination was found in the 1990 survey (environmental protection hardfiles).



DRAWN	CHKD.	APPD.	DATE	REV.	DESCRIPTION
JJA			1/89	1.0	
JJA			1/91	2.0	INFORMATION UPDATE

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

200 East Area
Operable Unit 200-PO-2

Figure 4-1. Location Map for Operable Unit 200-PO-2.

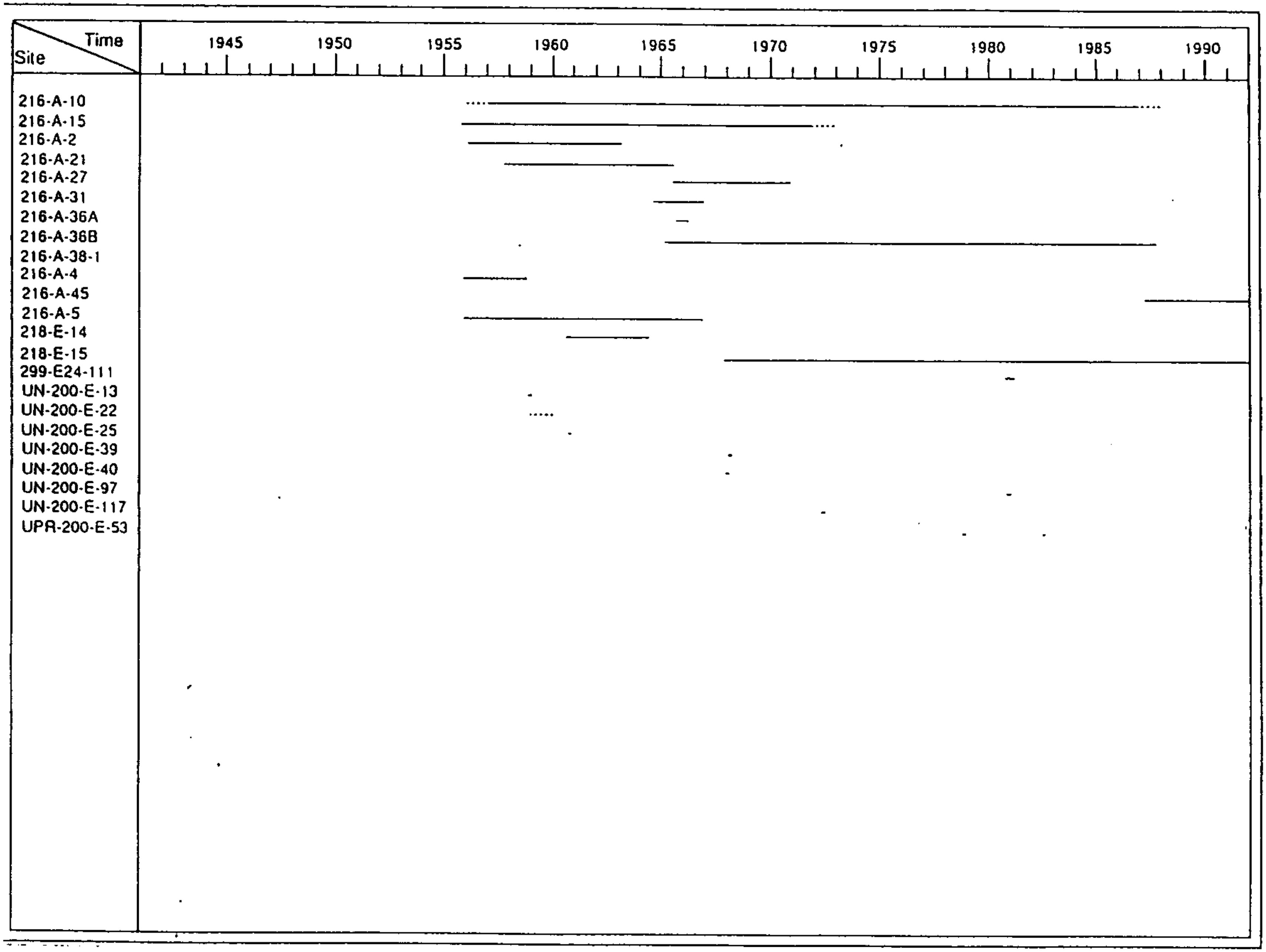


Figure 4-2. Summary of Operational Periods for Operable Unit 200-PO-2.

Table 4-1. Site Location and Waste Type for Operable Unit 200-PO-2.

Site	Type of Site	Status	Coordinates	Type of Waste
216-A-10	Crib	Inactive	N39090 W48952, N39370 W48952 (centerline)	Mixed Waste
216-A-15	French Drain	Inactive	N39516 W48656 (center)	Mixed Waste
216-A-2	Crib	Inactive	N39515 W48278 (center)	Mixed Waste
216-A-21	Crib	Inactive	N39300 W48160 (center)	Mixed Waste
216-A-27	Crib	Inactive	N39100 W48118, N39100 W48318 (centerline)	Mixed Waste
216-A-31	Crib	Inactive	N39370 W48290, N39370 W48360 (centerline)	Mixed Waste
216-A-36A	Crib	Inactive	N39000 W48525, N39100 W48525 (centerline)	Mixed Waste
216-A-36B	Crib	Inactive	N38500 W48525, N39000 W48525 (centerline)	Mixed Waste
216-A-38-1	Crib	Inactive	N39250 W49350	Nonhazardous/Nonradioactive
216-A-4	Crib	Inactive	N39515 W48158 (center)	Mixed Waste
216-A-45	Crib	Active	N38310 W49020 (head), N38310 W49345 (end)	Low-Level Waste
216-A-5	Crib	Inactive	N39397 W48713 (center)	Mixed Waste
299-E24-111	Injection Well	Inactive	N39161 W49425	Low-Level Waste
UN-200-E-117	Unplanned Release	Inactive	N38695 W48665	Mixed Waste
UN-200-E-13	Unplanned Release	Inactive	N39520 W48150	Mixed Waste
UN-200-E-22	Unplanned Release	Inactive	N39250 W48500	Mixed Waste
UN-200-E-25	Unplanned Release	Inactive	N39515 W48700	Mixed Waste
UN-200-E-39	Unplanned Release	Inactive	N38750 W48500	Mixed Waste
UN-200-E-40	Unplanned Release	Inactive	N38800 W48500	Mixed Waste
UN-200-E-97	Unplanned Release	Inactive	N39400 W48175	Mixed Waste
UPR-200-E-53	Unplanned Release	Inactive	N39450 W49675	Mixed Waste

Table 4-2. Operational Data and Waste Volumes for Operable Unit 200-PO-2.

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
216-A-10	Liquid	1956	March 1987		Bot	275	45	45	33000	3210000000	0.00	
216-A-15	Liquid	December 1955	1972		Bot	0	0	44	0	10000000	1.04	
216-A-2	Liquid	January 1956	January 1963		Bot	20	20	27	210	230000	4.39	
216-A-21	Liquid	October 1957	June 1965		Bot	60	16	19	1400	77900000	57.89	
216-A-27	Liquid	June 1965	July 1970		Bot	200	10	14	7700	23200000	57.89	
216-A-31	Liquid	July 1964	November 1966		Bot	70	10	24	310	10000	1.04	
216-A-36A	Liquid	September 1965	March 1966		Bot	100	11	22	110	1070000	50.34	
216-A-36B	Liquid	March 1966	September 6, 1987		Bot	500	11	25	830	317000000	0.00	
216-A-38-1	Liquid	Never used	Never used		Bot	520	15	37	0	0	0.00	
216-A-4	Liquid	December 1955	December 1958		Bot	20	20	26	210	6210000	47.82	
216-A-45	Liquid	March 4, 1987	Active		Bot	310	60	38	0	103000000	0.00	
216-A-5	Liquid	December 1955	October 1966		Bot	35	35	32	690	1630000000	60.40	
299-E24-111	Liquid	September 22, 1980	February 2, 1981		Top	0	0	0	0	0	0.00	
UN-200-E-117	Liquid			April 20, 1972	Top	0	0	0	0	0	0.00	
UN-200-E-13	Liquid			December 1958	Top	0	0	0	0	0	0.00	
UN-200-E-22	Liquid			1959	Top	0	0	0	0	0	0.00	
UN-200-E-25	Liquid			September 5, 1960	Top	0	0	0	0	0	1.09	
UN-200-E-39	Liquid			February 6, 1968	Top	26	26	0	0	0	1.04	
UN-200-E-40	Liquid			August 5, 1968	Top	0	0	0	0	0	1.04	
UN-200-E-97	Liquid			September 1980	Top	0	0	0	0	0	0.00	
UPR-200-E-53	Solid			October 17, 1978	Top	150	50	0	0	0	0.82	see 218-E-1 in 200-PO-1

Table 4-3. Summary of Current Site Conditions for Operable Unit 200-PO-2.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-A-10	Light Chain	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	None	None	0	15423
216-A-15	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Gravel	0.0	None	None	0	0
216-A-2	Light Chain	Crib	Concrete Post w/ Plaque	Gravel/Soil Cover	0.0	Brush/Grass	Inside PUREX	0	0
216-A-2	Light Chain	Crib	Concrete Post w/ Plaque	Gravel/Soil Cover	0.0	Brush/Grass	Inside PUREX	0	0
216-A-21	Light Chain	Could not determine	Concrete Post w/ Plaque	Gravel/Soil Cover	0.0	Brush/Grass	Inside PUREX	0	0
216-A-27	Light Chain	Underground Contamination	None	None/Unknown	0.0	Brush/Grass	Inside PUREX	15990	15990
216-A-31	Light Chain	Could not determine	Concrete Post w/ Plaque	Gravel/Soil Cover	0.0	None	Inside PUREX	0	0
216-A-36A	Light Chain	Underground Contamination	Concrete + Metal Posts	None/Unknown	0.0	Brush/Grass	None	15	13965
216-A-36B	Light Chain	Underground Contamination	Metal Post with Plaque	None/Unknown	0.0	Brush/Grass	Abuts Adjac. Site	150	13965
216-A-38-1	Light Chain	Crib	None	Gravel/Soil Cover	0.0	None	None	0	0
216-A-4	Light Chain	Could not determine	Could not determine	Gravel/Soil Cover	0.0	Brush/Grass	Inside PUREX	0	0
216-A-45	Light Chain	Underground Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	23420
216-A-5	Chain Link Fence	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	None	Inside PUREX	0	0
299-E24-111	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-117	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-13	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-22	Light Chain	Surface Contamination	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-25	Chain Link Fence	None	None	Gravel + Asphalt	0.0	Brush/Grass	Inside PUREX	0	0
UN-200-E-39	Light Chain	Underground Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-40	Light Chain	Underground Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-97	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UPR-200-E-53	None	Underground Contamination	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	0

Table 4-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-PO-2.

Site	Fluoride (kg)	NPH (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	NaCr2 (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	TBP (kg)	Sulfamic Acid (kg)
216-A-15	0	0	1	0	0	0	0	0	0	0	0	0	0	0
216-A-2	0	120000	0	0	0	0	0	0	0	0	0	0	70000	0
216-A-21	0	0	0	0	11000	300	0	0	0	400000	0	9000	0	15000
216-A-27	0	0	0	0	6000	200	0	0	0	300000	0	5000	0	9000
216-A-31	0	5200	0	0	0	0	0	0	0	0	0	0	2900	0
216-A-36A	0	0	0	0	0	0	0	0	0	3000	0	0	0	0
216-A-36B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216-A-4	0	0	0	0	4000	110	0	0	0	0	0	300	0	5000
216-A-5	0	0	0	0	0	0	0	0	0	0	0	1000000	0	0

The site was deactivated by blanking the effluent piping when the unit reached its specific retention capacity (Maxfield 1979). Unfortunately, the site is located within the PUREX surface contaminated area and could not be inspected closely by the authors. The crib is surrounded by a light chain barricade in addition to the PUREX contaminated zone barricade (site visit by authors, 1991).

4.3 216-A-5 CRIB

This unit is 450 ft south of the 202-A building and 1,400 ft west of Canton Avenue between the inner and outer PUREX exclusion area fences. This area is covered with gravel and is devoid of vegetation. A large green vent is located over the crib (site visit by authors, 1991).

This crib is a registered underground injection well. Until November 1961, the site received the process condensate from the 202-A building. From November 1961 to October 1966, the site was active but received no waste (backup for the 216-A-10). In October 1966, the site received the process condensate from the 202-A building. It received a total of 1,630,000,000 L of acidic waste containing cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990). The site was deactivated by valving out the effluent piping to the crib and rerouting it to the 216-A-10 crib (Maxfield 1979; Lundgren 1970).

Wells E24-1, E24-56, E24-57, and E24-58 monitor this site. The data indicate that breakthrough to groundwater could have occurred (Fecht et al. 1977). In November 1983, the site was stabilized when PUREX exclusion area fences were put up (Stenner et al. 1988). No contamination was detected in the 1989 survey (BHI 1994).

4.4 216-A-10 CRIB

This unit is located about 390 ft south of the 202-A building (PUREX). During 1956, the site was used only for testing purposes using nonradioactive water (Johnson 1980). From 1956 to November 1961, the site was inactive (Anderson 1976). From November 1961 to January 1978, the site received process condensate from the 202-A building (Kephart and Sliger 1980). From January 1978 to October 1981, the site was again inactive. From October 1981 to 1986, the site received the process condensate from the 202-A building (BHI 1994). The crib received a total of 3,210,000,000 L of waste (Coony and Thomas 1989) containing americium-241, cesium-137, tritium, iodine-129, promethium-147, plutonium-238, plutonium-239, plutonium-214, ruthenium-106, strontium-90 (Brown et al. 1990).

Surveillance information suggests that since the beginning of 1984, tritium concentrations beneath the site have been increasing. Nitrate concentrations have also been continually increasing since March 1984, tripling since September 1985. Measurements of alpha radiation in well 299-E24-02 have increased sixfold since September 1985, and are presently twice the uranium-238 concentration limit. The nitrate level is currently fluctuating at about five times the drinking water standards. However, no surface contamination was identified by the 1990 radiological survey (BHI 1994).

An unnamed site has been identified between the road leading north to the PUREX compound and sites 216-A-5 and 216-A-10. It is a 60 ft by 60 ft area, enclosed with a light chain barricade and surface contamination placards. The area is covered with gravel. This site is not identified in either health physics or environmental protection records.

4.5 216-A-15 FRENCH DRAIN

This drain is located about 270 ft south of the center of the 202-A building (Harmon et al. 1975). This drain received 10,000,000 L of acidic waste and is a registered underground injection well (Stenner et al. 1988; DOE-RL 1988). Drainage from the 216-A-10 process condensate sampler pit was discharged to the unit. The waste contains less than 50 Ci total beta activity (Stenner et al. 1988). No contamination was detected during the 1989 survey (BHI 1994). Currently, the 216-A-5 sampler pit, next to this drain, is cordoned off with light chain and radiation placards (site visit by authors, 1991).

4.6 216-A-21 CRIB

The 216-A-21 crib was established about 600 ft south of the 202-A building and 750 ft west of Canton Avenue (Maxfield 1979). Until June 1958, the site received sump waste from the 293-A building. From June 1958 to December 1958, the site was inactive. From December 1958 to June 1965, the site received the above effluent, laboratory cell drainage from the 202-A building, and the 291-A-1 stack drainage (Stenner et al. 1988). A total of 77,900,000 L of low-salt neutral/basic waste containing cesium-137, ruthenium-106, and strontium-90 was discharged to the crib (Brown et al. 1990).

The site was deactivated when effluent flow rate exceeded the infiltration capacity by blanking the effluent pipeline to the crib (Maxfield 1979). The effluents were rerouted to the 216-A-27 crib (Lundgren 1970). The crib is inside the PUREX surface contaminated area and could not be approached closely (site visit by authors, 1991).

Well E24-12 monitor this unit. The waste volume and waste inventory indicate breakthrough to groundwater has not occurred (Fecht et al. 1977). However, direct contamination was identified on the riser closest to the crib vent during the 1990 radiological survey. The contamination level was 15,000 dis/min (beta-gamma) (environmental protection hardfiles).

4.7 216-A-27 CRIB

The 216-A-27 crib is located about 700 ft south of the 202-A building and about 800 ft west of Canton Avenue, partly within the PUREX exclusion area (Maxfield 1979). The unit received 23,200,000 L of sump waste from the 293-A building, lab cell drainage from the 202-A building, and the 291-A-1 stack drainage (Stenner et al. 1988). The waste is thought to contain cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

Wells E17-2 and E17-3 monitor this unit. Data indicate breakthrough to groundwater has not occurred at this site (Fecht et al. 1977). Contamination was not detected during the 1990 survey (BHI 1994). Most of the area of this crib is located inside the PUREX security zone (site visit by authors, 1991).

4.8 216-A-31 CRIB

The 216-A-31 crib is located about 500 ft south of the 202-A building (Maxfield 1979). This crib is located inside the PUREX surface contamination area and could not be approached closely (site visit by authors, 1991). Over 10,000 L of neutral organic waste containing cesium-137, ruthenium-106, and strontium-90 from the 202-A building was discharged to the site (Stenner et al. 1988). The site was deactivated by blanking the L cell nozzles to the 241-A-151 diversion box, which routed effluents to the unit (Maxfield 1979).

Well E24-9 monitors this unit. The waste inventory and waste volume indicate that no breakthrough to groundwater has occurred at this area (Fecht et al. 1977). No surface contamination was detected during the 1989 survey at this site (environmental protection hardfiles).

4.9 216-A-36A CRIB

The 216-A-36A crib is located about 750 ft south of the 202-A building and 1,150 ft west of Canton Avenue (Maxfield 1979). A total of 1,070,000 L of ammonium scrubber waste thought to contain cesium-137, ruthenium-106, and strontium-90 from the 202-A building was discharged to the crib (Stenner et al. 1988). The crib was deactivated because of a large discharge of fission products. A concrete dam was placed between this unit and the 216-A-36B crib, and the pipeline was extended to the 216-A-36B crib (Maxfield 1979).

Wells E17-4, E17-9, and E17-10 monitor this unit, and indicate that breakthrough to groundwater has not occurred (Fecht et al. 1977). The 1990 radiological survey did not identify any areas of contamination at this site (BHI 1994).

4.10 216-A-36B CRIB

The 216-A-36B crib is located about 1,200 ft south of the 202-A building (Cramer 1987). Until October 1972, the site received 317,000,000 L of the ammonia scrubber waste from the 202-A building (Maxfield 1979). The following radioisotopes are though to be present: americium-241, cesium-137, tritium, iodine-129, promethium-147, plutonium-239, plutonium-241, ruthenium-106, tin-113, and strontium-90. The site was retired in October 1972. In November 1982, the site was reactivated to receive the above wastes when PUREX operations resumed (Sliger 1983).

Well 299-E17-05 shows total alpha and total uranium concentrations are two times the concentration limit from uranium-238. However, concentrations of uranium isotopes are below the concentration limits. Tritium has an increasing trend since August 1984. An increasing trend occurred in the contaminant NO_3 from June 1984 to February 1985. NO_3 currently fluctuates around two times the drinking water standards. However, no surface contamination was detected during the 1990 survey (BHI 1994).

4.11 216-A-38-1 CRIB

Crib 216-A-38-1 is located about 600 ft southwest of the 202-A building, and about 1,500 ft north of 1st Street (Maxfield 1979). This site was never activated. It was intended to receive the liquid waste discharged to the 261-A-10 crib (Lundgren 1970). The site has been stabilized due to cross contamination from surrounding sites (Diediker and Hall 1985). No surface contamination was found at this site during the 1989 survey (BHI 1994).

4.12 216-A-45 CRIB

The 216-A-45 crib is located about 750 ft southwest of the 216-A-10 crib (Cramer 1987). The site has received a total of 103,000,000 L of process condensate thought to contain americium-241, cesium-137, tritium, iodine-139, promethium-147, plutonium-238, plutonium-239, plutonium-241, ruthenium-106, tin-113, and strontium-106 from the 202-A building, and is still active (Cramer 1987).

The 216-A-45 crib replaced the 216-A-10 crib. A neutralization system was placed into operation to preclude the discharge of process condensate outside the range 2.0 and 12.5 pH units (Coony and Thomas 1988). The 1990 radiological survey did not identify areas of contamination at this site (BHI 1994).

4.13 299-E24-111 INJECTION WELL

The 299-E24-111 injection well is located southwest of PUREX, west of the 216-A-38-1 crib. The area is enclosed within the PUREX surface contaminated area, which is paved with asphalt or covered with gravel (site visit by authors, 1991). Two enclosures are present at the well site. One light chain enclosure is marked surface contamination, and has several drums with contents labeled trash from the well (gloves, tape, etc.). The other enclosure is marked underground contamination and encloses a vertical pipe, assumed to be the injection well, and one monitoring well (site visit by authors, 1991). Wells drilled for monitoring the injection well are marked by 0.5-ft-tall iron pipes with steel caps.

The 299-E24-111 injection well received 11, 1,000-gal injections (11,000 gal total) of uniform solutions of calcium chloride, calcium nitrate and tracers comprised of cesium-134 and strontium-90 (Sisson and Lu 1984). The unit was part of an experimental test site constructed to obtain radionuclide migration data for model forecasting (Sisson and Lu 1984).

4.14 UN-200-E-13 UNPLANNED RELEASE

In December 1958, the 216-A-4 crib plugged and flooded an area between the 216-A-4 crib and the 291-A-1 stack contaminating the ground surface (Stenner et al. 1988). The contaminated soil was removed to a trench along the south boundary of the 216-A-4 crib and covered with 1 ft of soil (Stenner et al. 1988). The waste type and amount released has not been identified (BHI 1994). The area is enclosed within the PUREX surface contaminated area, which is paved with asphalt or covered with gravel (site visit by authors, 1991).

4.15 UN-200-E-22 UNPLANNED RELEASE

General contamination that had been building around the 291-A-1 stack was detected in 1959. The heaviest concentration of the mixed fission products are northwest and southeast of the stack within an 300 ft area (Baldridge 1959). The area was staked and chained off with radiation warning signs (Stenner et al. 1988). The area is enclosed within the PUREX surface contamination zone (site visit by authors, 1991).

4.16 UN-200-E-25 UNPLANNED RELEASE

On September 5, 1960, leakage from the 241-A-151 diversion box contaminated an area southwest of PUREX to 200 ft beyond the limited area fence. The contamination had unknown beta/gamma with readings to 100,000 c/m (Stenner et al. 1988). The coordinates given in BHI (1994) suggest an area outside the PUREX surface contamination zone, in an area paved with gravel or asphalt (site visit by authors, 1991).

4.17 UN-200-E-39 UNPLANNED RELEASE

Pressurized ammonia scrubber waste was inadvertently released through the vent at the 216-A-36B crib sampling stack on February 6, 1968. The waste had radioactivity readings of 20 to 450 mR/h (Stenner et al. 1988). The sampler stack at the 216-A-36B crib has been removed and there are no markers indicating this spill (site visit by authors, 1991).

4.18 UN-200-E-40 UNPLANNED RELEASE

On August 5, 1968, the vent line at the 216-A-36B crib sampling stack was inadvertently left open and contaminated a 50 ft^2 area of the surrounding blacktop. The unspecified waste had readings of unknown beta/gamma with readings to a maximum of 150 mR/h (Stenner et al. 1988). The sampler stack at the 216-A-36B crib has been removed. At the present time there are no markers suggesting a spill occurred in this area (site visit by authors, 1991).

4.19 UN-200-E-97 UNPLANNED RELEASE

Ground contamination from an unknown source was detected south of PUREX near the railroad tunnel (Stenner et al. 1988). On a field survey on September 22, 1981, the site could not be located. Currently, the area south of the exclusion fence, in the vicinity of the railway tunnel, is not posted with warning signs (site visit by authors, 1991). The actual date of occurrence is unknown (BHI 1994).

Apparently, the surface contamination was removed and the zone eliminated when the double-exclusion fence was built around the 202-A building. The area was released from zone posting and established as a UPR site in September 1980 (Stenner et al. 1988).

4.20 UN-200-E-117 UNPLANNED RELEASE

On April 20, 1972, an excavation exposed liquid spurting up out of the ground within a few inches of the top of the waste encasement on the west side of the PUREX railroad tunnel. The waste site had readings up to 2,000 mR/h of cesium and strontium, including 500 mR/h at 1 ft from the liquid (Stenner et al. 1988). There are no markers to indicate a spill occurred at the coordinates given in BHI (1994) (site visit by authors, 1991).

4.21 UPR-200-E-53 UNPLANNED RELEASE

This release actually occurred at the 218-E-1 burial ground in Operable Unit 200-PO-1, but the contamination spread into this operable unit. For a more detailed description of the incident refer to Section 3.16, the 218-E-1 burial ground.

5.0 OPERABLE UNIT 200-PO-3

The third operable unit of the PUREX Aggregate Area, 200-PO-3, contains all of the A and C series tank farms. It is located along the eastern border of the 200 East Area, north of Operable Unit 200-PO-1 (Figures 1-1, 5-1, and 5-2). Figure 5-3 provides a graphical summary of the operational history of the individual sites. Table 5-1 provides the site locations and waste types for Operable Unit 200-PO-3. The starting and stopping dates are based on data contained in BHI (1994) and listed in Table 5-2.

Spatial relationships and transfer configurations between the various 200 Area tank farms and diversion boxes are extremely complex. The entire tank farm system is designed to allow movement of waste between tank farms. Figure 5-4 depicts the general tank farm waste distribution system for the 200 East and West Areas. A more detailed figure showing the current waste transfer configuration of the 200 East Area is shown in Figure 5-5. It is clear that the configuration of tanks, valve pits, and diversion boxes permit the transfer of waste from any processing plant to any tank, or between any two tanks, located anywhere within the 200 East or West Areas.

Three inactive tank farms, the 241-A, 241-AX, and 241-C, and their associated facilities, such as diversion boxes, valve pits, and catch tanks were evaluated in this study. All three tank farms contain single-shell tanks (SST) (Table 5-1). Tank farms were not evaluated to determine their potential migration hazard, therefore the sites in this operable unit have a hazard rank of 0 (Table 5-2; Stenner et al. 1988).

Table 5-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November, 1991. Note, the lack of a defined surface contamination or radiation zone in the table does not imply that the facility is not enclosed within a contamination zone. The site may be located in a larger contamination zone, and the Health Physics Department may not have designated a specific zone for that individual site.

A list of the organic and inorganic contaminants that were part of the waste disposed in the facilities is given in Table 5-4. This data was extracted from BHI (1994) and has not been validated by the authors. It should be used as a guideline only. In addition, Appendix C provides a listing of the radionuclides, selected elements, and selected organic and inorganic compounds for each tank of the operable unit listed in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1991).

This radionuclide and chemical database was created by a computer simulation model, named TRAC, which was constructed to track the radionuclides in the 200 Area tank farms. To accomplish this, the entire tank farm system for both the 200 East and 200 West Areas was modeled. In November 1991, the model underwent a DOE quality assurance spot audit. Currently, model predictions are being calibrated against field samples. The radionuclides listed by the TRAC model have been decayed through 1985 (Simpson, Personal Communication).

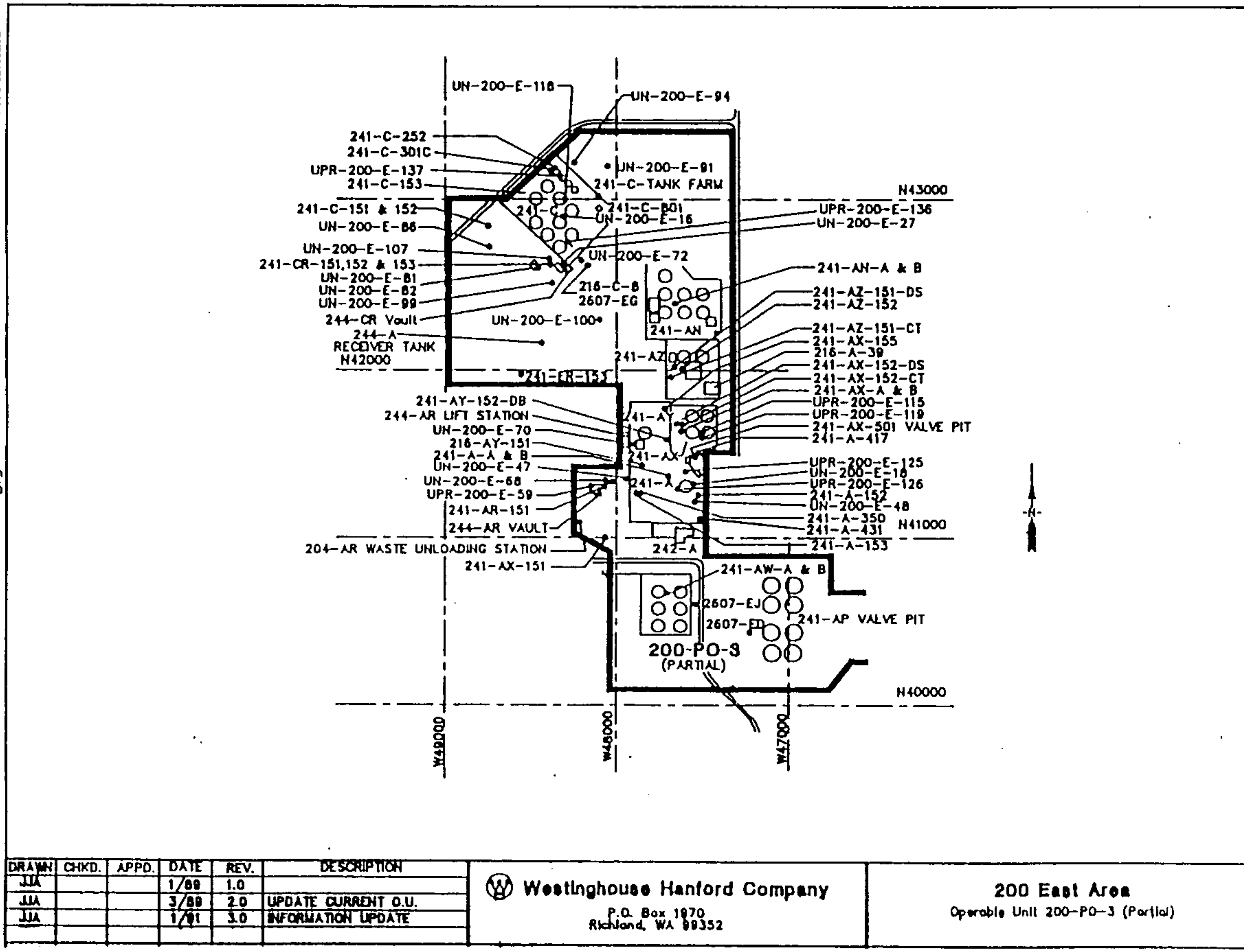


Figure 5-1. Location Map for Operable Unit 200-PO-3 (partial).

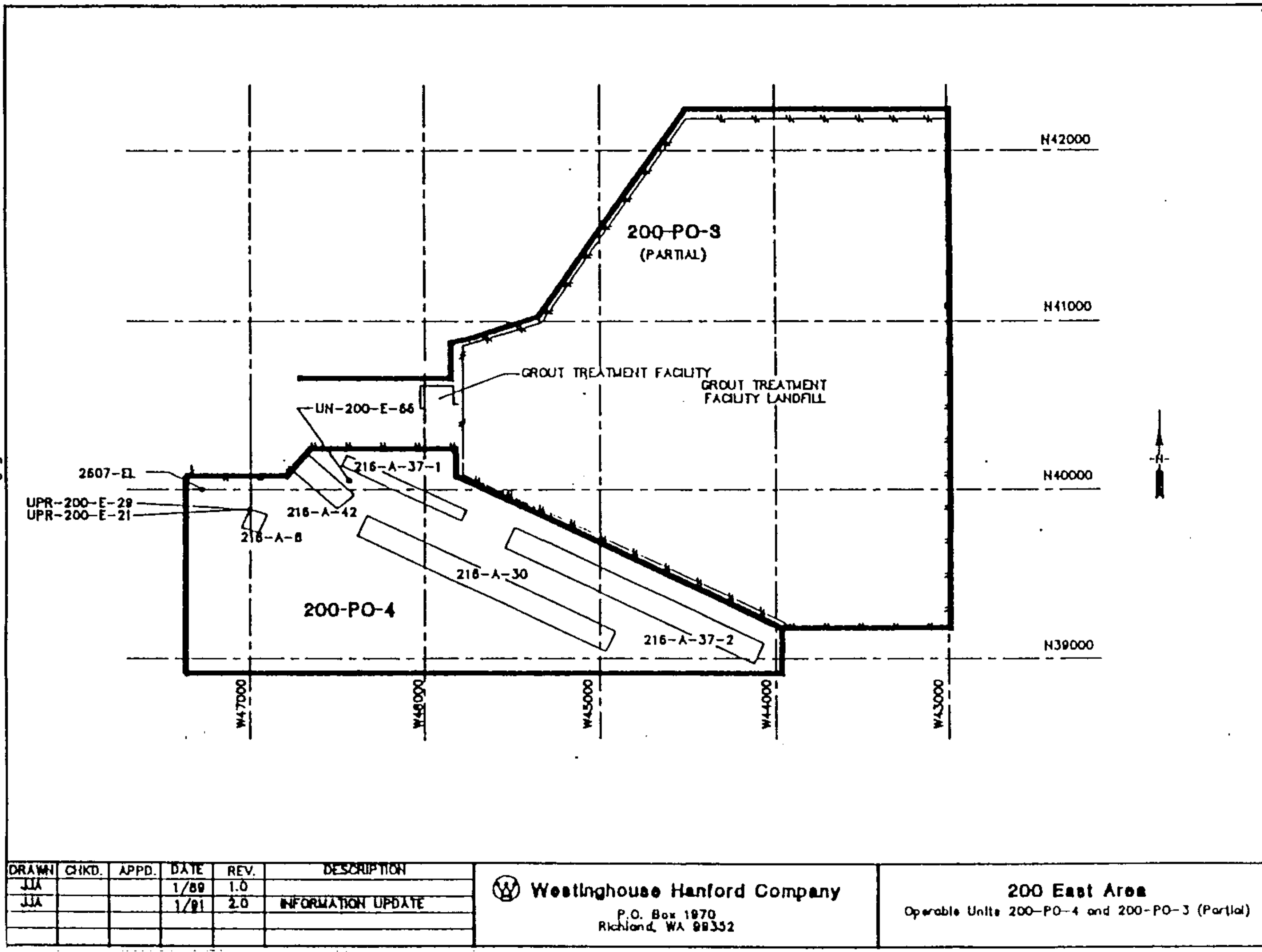


Figure 5-2. Location Map for Operable Units 200-PO-3 (partial) and 200-PO4.

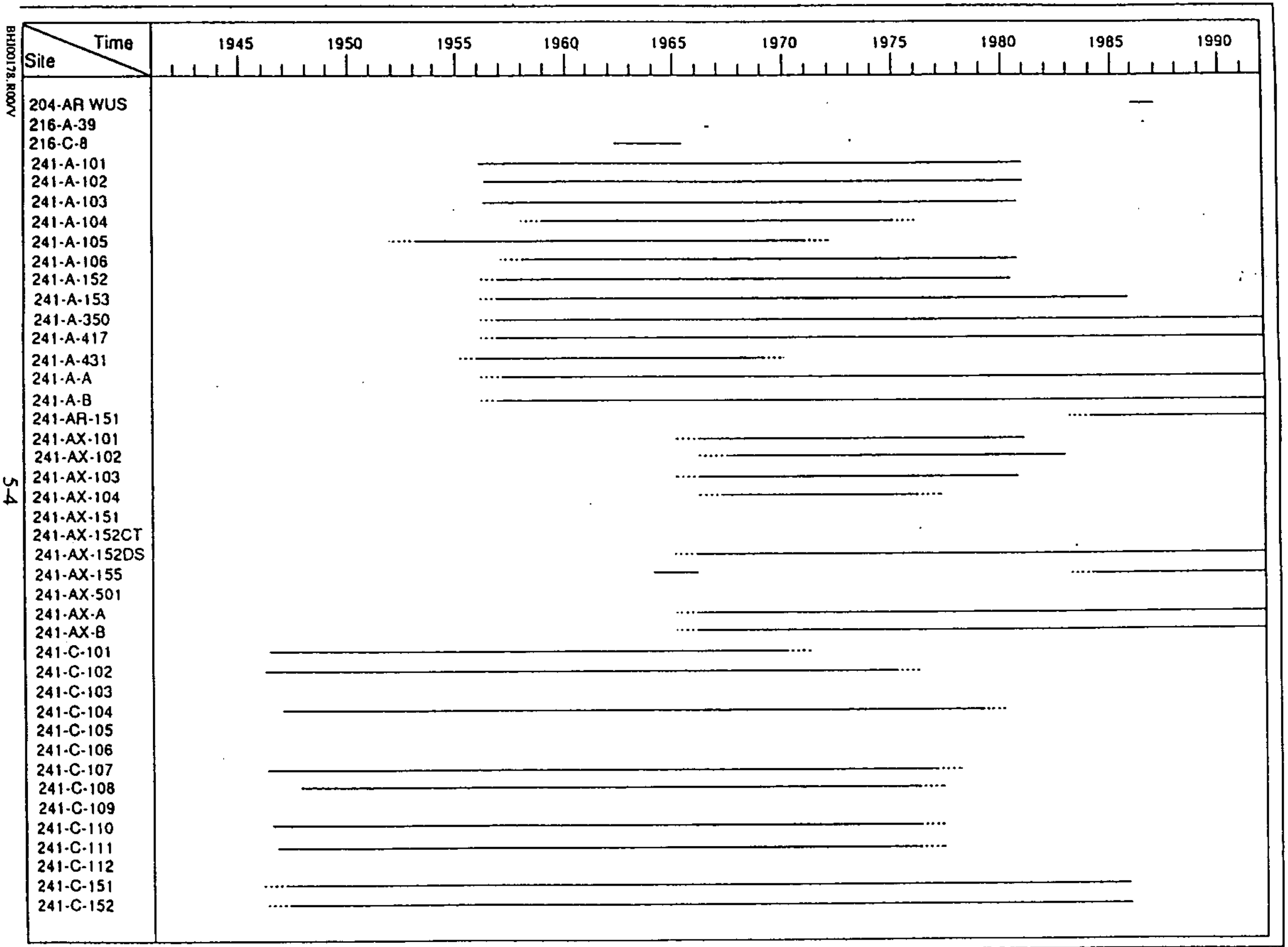


Figure 5-3. Summary of Operational Periods for Operable Unit 200-PO-3.
(sheet 1 of 2)

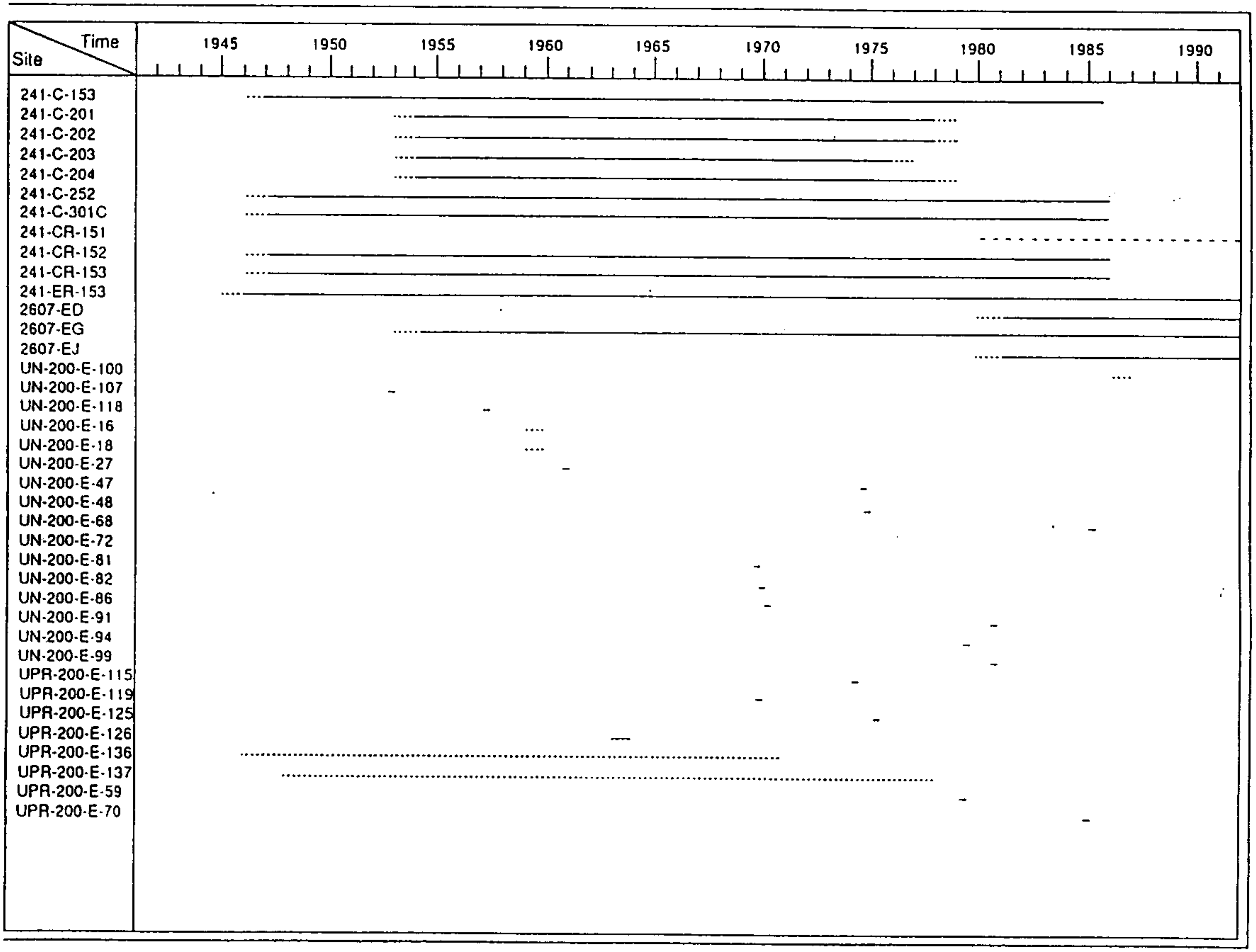


Figure 5-3. Summary of Operational Periods for Operable Unit 200-PO3. (sheet 2 of 2)

Table 5-1. Site Location and Waste Type for 200-PO-3.
(sheet 1 of 2)

Site	Type of Site	Status	Coordinates	Type of Waste
216-A-39	Crib	Inactive	N41860 W47489, N41860 W47399, N41930 W47489, N41930 W47399	Mixed Waste
216-C-8	French Drain	Inactive	N42625 W48168 (center)	Mixed Waste
241-A-101	Single-Shell Tank	Inactive	N41205 W47804	Mixed Waste
241-A-102	Single-Shell Tank	Inactive	N41205 W47702	Mixed Waste
241-A-103	Single-Shell Tank	Inactive	N41205 W47600	Mixed Waste
241-A-104	Single-Shell Tank	Inactive	N41307 W47804	Mixed Waste
241-A-105	Single-Shell Tank	Inactive	N41307 W47702	Mixed Waste
241-A-106	Single-Shell Tank	Inactive	N41307 W47600	Mixed Waste
241-A-152	Diversion Box	Inactive	N41220 W47405, N41280 W47405	Mixed Waste
241-A-153	Diversion Box	Inactive	N41268 W47857	Mixed Waste
241-A-350	Catch Tank	Active	N41266 W47568	Mixed Waste
241-A-417	Catch Tank	Active	N41510 W47600	Mixed Waste
241-A-431	Building	Inactive	N41172 W47457	Mixed Waste
241-A-A	Diversion Box	Active	N41380 W47700	Mixed Waste
241-A-B	Diversion Box	Active	N41380 W47700	Mixed Waste
241-AR-151	Diversion Box	Active	N41350 W48006	Mixed Waste
241-AX-101	Single-Shell Tank	Inactive	N41731 W47475	Mixed Waste
241-AX-102	Single-Shell Tank	Inactive	N41629 W47475	Mixed Waste
241-AX-103	Single-Shell Tank	Inactive	N41731 W47565	Mixed Waste
241-AX-104	Single-Shell Tank	Inactive	N41629 W47565	Mixed Waste
241-AX-151	Diversion Box	Active	N40930 W48060	Mixed Waste
241-AX-152CT	Catch Tank	Active	N41680 W47657	Mixed Waste
241-AX-152DS	Diversion Box	Active	N41680 W47656	Mixed Waste
241-AX-155	Diversion Box	Active	N41790 W47725	Mixed Waste
241-AX-501	Valve Pit	Active	N41481 W47543	Mixed Waste
241-AX-A	Diversion Box	Active	N41600 W47627	Mixed Waste
241-AX-B	Diversion Box	Active	N41569 W47627	Mixed Waste
241-C-101	Single-Shell Tank	Inactive	N42719 W48327	Mixed Waste
241-C-102	Single-Shell Tank	Inactive	N42790 W48256	Mixed Waste
241-C-103	Single-Shell Tank	Inactive	N42681 W48185	Mixed Waste
241-C-104	Single-Shell Tank	Inactive	N42790 W48390	Mixed Waste
241-C-105	Single-Shell Tank	Inactive	N42861 W48327	Mixed Waste
241-C-106	Single-Shell Tank	Inactive	N42932 W48256	Mixed Waste
241-C-107	Single-Shell Tank	Inactive	N42861 W48469	Mixed Waste
241-C-108	Single-Shell Tank	Inactive	N42932 W48390	Mixed Waste
241-C-109	Single-Shell Tank	Inactive	N43002 W48327	Mixed Waste
241-C-110	Single-Shell Tank	Inactive	N42932 W48540	Mixed Waste
241-C-111	Single-Shell Tank	Inactive	N43002 W48469	Mixed Waste
241-C-112	Single-Shell Tank	Inactive	N43075 W48390	Mixed Waste
241-C-151	Diversion Box	Inactive	N42750 W48750	Mixed Waste

Table 5-1. Site Location and Waste Type for 200-PO-3. (sheet 2 of 2)

241-C-152	Diversion Box	Inactive	N42825 W48750	Mixed Waste
241-C-153	Diversion Box	Inactive	N42850 W48660	Mixed Waste
241-C-201	Single-Shell Tank	Inactive	N43055 W48239	Mixed Waste
241-C-202	Single-Shell Tank	Inactive	N43091 W48275	Mixed Waste
241-C-203	Single-Shell Tank	Inactive	N43126 W48310	Mixed Waste
241-C-204	Single-Shell Tank	Inactive	N43161 W48346	Mixed Waste
241-C-252	Diversion Box	Inactive	N43175 W48425	Mixed Waste
241-C-301C	Catch Tank	Inactive	N43150 W48400	Mixed Waste
241-CR-151	Diversion Box	Inactive	N42650 W48475	Mixed Waste
241-CR-152	Diversion Box	Inactive	N42675 W48500	Mixed Waste
241-CR-153	Diversion Box	Inactive	N42675 W48500	Mixed Waste
2607-ED	Septic Tank	Active	N40600 W47275	Nonhazardous/Nonradioactive
2607-EG	Septic Tank	Active	N42600 W48250	Nonhazardous/Nonradioactive
2607-EJ	Septic Tank	Active	N40550 W47550	Nonhazardous/Nonradioactive
UN-200-E-100	Unplanned Release	Inactive	N42300 W48100	Mixed Waste
UN-200-E-107	Unplanned Release	Inactive	N42650 W48425	Mixed Waste
UN-200-E-118	Unplanned Release	Inactive	N43000 W48300	Mixed Waste
UN-200-E-16	Unplanned Release	Inactive	N42900 W48310	Mixed Waste
UN-200-E-18	Unplanned Release	Inactive	N41320 W47550	Mixed Waste
UN-200-E-27	Unplanned Release	Inactive	N42625 W48325	Mixed Waste
UN-200-E-47	Unplanned Release	Inactive	N41375 W47950	Mixed Waste
UN-200-E-48	Unplanned Release	Inactive	N41300 W47875	Mixed Waste
UN-200-E-68	Unplanned Release	Inactive	N41350 W48075	Mixed Waste
UN-200-E-72	Unplanned Release	Inactive	N42625 W48225	Mixed Waste
UN-200-E-81	Unplanned Release	Inactive	N42600 W48460	Mixed Waste
UN-200-E-82	Unplanned Release	Inactive	N42850 W48750	Mixed Waste
UN-200-E-86	Unplanned Release	Inactive	N42725 W48745	Mixed Waste
UN-200-E-91	Unplanned Release	Inactive	N43200 W48050 (center)	Mixed Waste
UN-200-E-94	Unplanned Release	Inactive	N43850 W46450	Mixed Waste
UN-200-E-99	Unplanned Release	Inactive	N42275 W48125	Mixed Waste
UPR-200-E-115	Unplanned Release	Inactive	N41632 W47500	Mixed Waste
UPR-200-E-119	Unplanned Release	Inactive	N41600 W47500	Mixed Waste
UPR-200-E-125	Unplanned Release	Inactive	N41307 W47804 (center)	Mixed Waste
UPR-200-E-126	Unplanned Release	Inactive	N41307 W47702 (center)	Mixed Waste
UPR-200-E-136	Unplanned Release	Inactive	N42719 W48328	Mixed Waste
UPR-200-E-137	Unplanned Release	Inactive	N43126 W48310	Mixed Waste
UPR-200-E-59	Unplanned Release	Inactive	N41475 W47600	Mixed Waste

Table 5-2. Operational Data and Waste Volumes for 200-PO-3. (sheet 1 of 2)

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
216-A-39	Liquid	June 1966	June 1966		Top	0	0	0	240	20	0.10	
216-C-8	Liquid	June 1962	June 1965		Top	0	0	0	0	10000	0.71	
241-A-101	Liquid	January 24, 1956	November 21, 1980		Top	0	0	0	0	0	0.00	
241-A-102	Liquid	March 22, 1956	November 21, 1980		Top	0	0	0	0	0	0.00	
241-A-103	Liquid	May 17, 1956	August 14, 1980		Top	0	0	0	0	0	0.00	
241-A-104	Liquid	1958	1975		Top	0	0	0	0	0	0.00	UPR-200-E-125 (leak)
241-A-105	Liquid	1962	1971		Top	0	0	0	0	0	0.00	UPR-200-E-126 (leak)
241-A-106	Liquid	1957	August 14, 1980		Top	0	0	0	0	0	0.00	
241-A-152	Liquid	1956	May 1980		Top	61	24	19	0	0	0.00	
241-A-153	Liquid	1956	July 1985		Top	17	10	13	0	0	0.00	
241-A-350	Liquid	1956	Active		Top	0	0	0	0	0	0.00	
241-A-417	Liquid	1956	Active		Top	26	11	0	0	0	0.00	
241-A-431	Solid	1955	1969		Top	21	16	0	0	0	0.00	
241-A-A	Liquid	1956	Active		Top	14	12	8	0	0	0.00	
241-A-B	Liquid	1956	Active		Top	14	12	8	0	0	0.00	
241-AR-151	Liquid	1983	Active		Top	0	0	0	0	0	0.00	
241-AX-101	Liquid	1965	November 12, 1980		Top	0	0	0	0	0	0.00	
241-AX-102	Liquid	1966	September 8, 1980		Top	0	0	0	0	0	0.00	
241-AX-103	Liquid	1965	September 8, 1980		Top	0	0	0	0	0	0.00	UPR-200-E-115
241-AX-104	Liquid	1966	1976		Top	0	0	0	0	0	0.00	UPR-200-E-119
241-AX-151	Liquid	unknown	Active		Top	44	10	25	0	0	0.00	
241-AX-152CT	Liquid	unknown	Active		Top	0	0	0	0	0	0.00	
241-AX-152DS	Liquid	1965	Active		Top	25	9	29	0	0	0.00	
241-AX-155	Liquid	1983	Active		Top	0	0	0	0	0	0.00	
241-AX-501	Liquid		Active		Top	8	6	7	0	0	0.00	
241-AX-A	Liquid	1965	Active		Top	14	12	8	0	0	0.00	
241-AX-B	Liquid	1965	Active		Top	14	12	8	0	0	0.00	
241-C-101	Liquid	March 1946	1970		Top	0	0	0	0	0	0.00	UPR-200-E-136 (leak)
241-C-102	Liquid	May 1946	1976		Top	0	0	0	0	0	0.00	
241-C-103	Liquid	August 1946	1979		Top	0	0	0	0	0	0.00	
241-C-104	Liquid	October 1946	1980		Top	0	0	0	0	0	0.00	
241-C-105	Liquid	February 1946	1979		Top	0	0	0	0	0	0.00	
241-C-106	Liquid	June 1947	1979		Top	0	0	0	0	0	0.00	
241-C-107	Liquid	April 1946	1978		Top	0	0	0	0	0	0.00	
241-C-108	Liquid	September 1947	1976		Top	0	0	0	0	0	0.00	
241-C-109	Liquid	April 1948	1976		Top	0	0	0	0	0	0.00	
241-C-110	Liquid	May 1946	1976		Top	0	0	0	0	0	0.00	

Table 5-2. Operational Data and Waste Volumes for 200-PO-3. (sheet 2 of 2)

241-C-111	Liquid	August 1946	1976		Top	0	0	0	0	0	0.00	
241-C-112	Liquid	November 1946	1976		Top	0	0	0	0	0	0.00	
241-C-151	Liquid	1946	July 1985		Top	20	9	12	0	0	0.00	
241-C-152	Liquid	1946	July 1985		Top	28	9	12	0	0	0.00	
241-C-153	Liquid	1946	July 1985		Top	34	9	11	0	0	0.00	
241-C-201	Liquid	1953	1977		Top	0	0	0	0	0	0.00	
241-C-202	Liquid	1953	1977		Top	0	0	0	0	0	0.00	
241-C-203	Liquid	1953	1976		Top	0	0	0	0	0	0.00	UPR-200-E-137 (leak)
241-C-204	Liquid	1953	1977		Top	0	0	0	0	0	0.00	
241-C-252	Liquid	1946	July 1985		Top	36	9	15	0	0	0.00	
241-C-301C	Liquid	1946	July 1985		Top	0	0	0	0	0	0.00	
241-CR-151	Liquid		post-1980		Top	0	0	0	0	0	0.00	
241-CR-152	Liquid	1946	July 1985		Top	0	0	0	0	0	0.00	
241-CR-153	Liquid	1946	July 1985		Top	0	0	0	0	0	0.00	
2607-ED	Liquid	1980	Active		Top	0	0	0	0	0	0.00	
2607-EG	Liquid	1953	Active		Top	0	0	0	0	0	0.00	
2607-EJ	Liquid	1980	Active		Top	0	0	0	0	0	0.00	
UN-200-E-100	Liquid			1986	Top	0	0	0	0	0	0.00	
UN-200-E-107	Liquid			November 26, 1952	Top	0	0	0	0	19	1.04	
UN-200-E-118	Solid			April 20, 1957	Top	0	0	0	0	0	0.00	
UN-200-E-16	Liquid			1959	Top	50	20	0	0	0	0.00	
UN-200-E-18	Liquid			1959	Top	0	0	0	0	0	0.00	
UN-200-E-27	Solid			November 1, 1960	Top	0	0	0	0	0	0.00	
UN-200-E-47	Solid			October 15, 1974	Top	0	0	0	0	0	1.09	
UN-200-E-48	Liquid			November 22, 1974	Top	0	0	0	0	0	0.82	
UN-200-E-68	Solid			January 11, 1985	Top	0	0	0	0	0	0.00	
UN-200-E-72	Solid			April 20, 1985	Top	0	0	0	0	0	0.00	
UN-200-E-81	Liquid			October 1969	Top	40	6	0	0	136274	1.20	
UN-200-E-82	Liquid			December 19, 1969	Top	0	0	0	0	9842	1.04	
UN-200-E-86	Liquid			March 1971	Top	0	0	0	0	0	1.04	
UN-200-E-91	Solid			September 1980	Top	0	0	0	0	0	0.00	
UN-200-E-94	Liquid			June 1979	Top	100	30	3	0	0	0.98	
UN-200-E-99	Liquid			September 1980	Top	0	0	0	0	0	0.00	
UPR-200-E-115	Liquid			February 12, 1974	Top	0	0	0	0	0	0.00	
UPR-200-E-119	Solid			December 22, 1969	Top	0	0	0	0	0	1.04	
UPR-200-E-125	Liquid			May 1975	Top	0	0	0	0	0	0.00	
UPR-200-E-126	Liquid			1963	Top	0	0	0	0	0	0.00	
UPR-200-E-136	Liquid			1946-1970	Top	0	0	0	0	0	0.00	
UPR-200-E-137	Liquid			1947-1977	Top	0	0	0	0	0	0.00	
UPR-200-E-59	Solid			May 23, 1979	Top	0	0	0	0	0	0.00	see 216-A-40 in 200-PO-1

Figure 5-4. Schematic Diagram Depicting the 200 Areas Tank Farm distribution System.

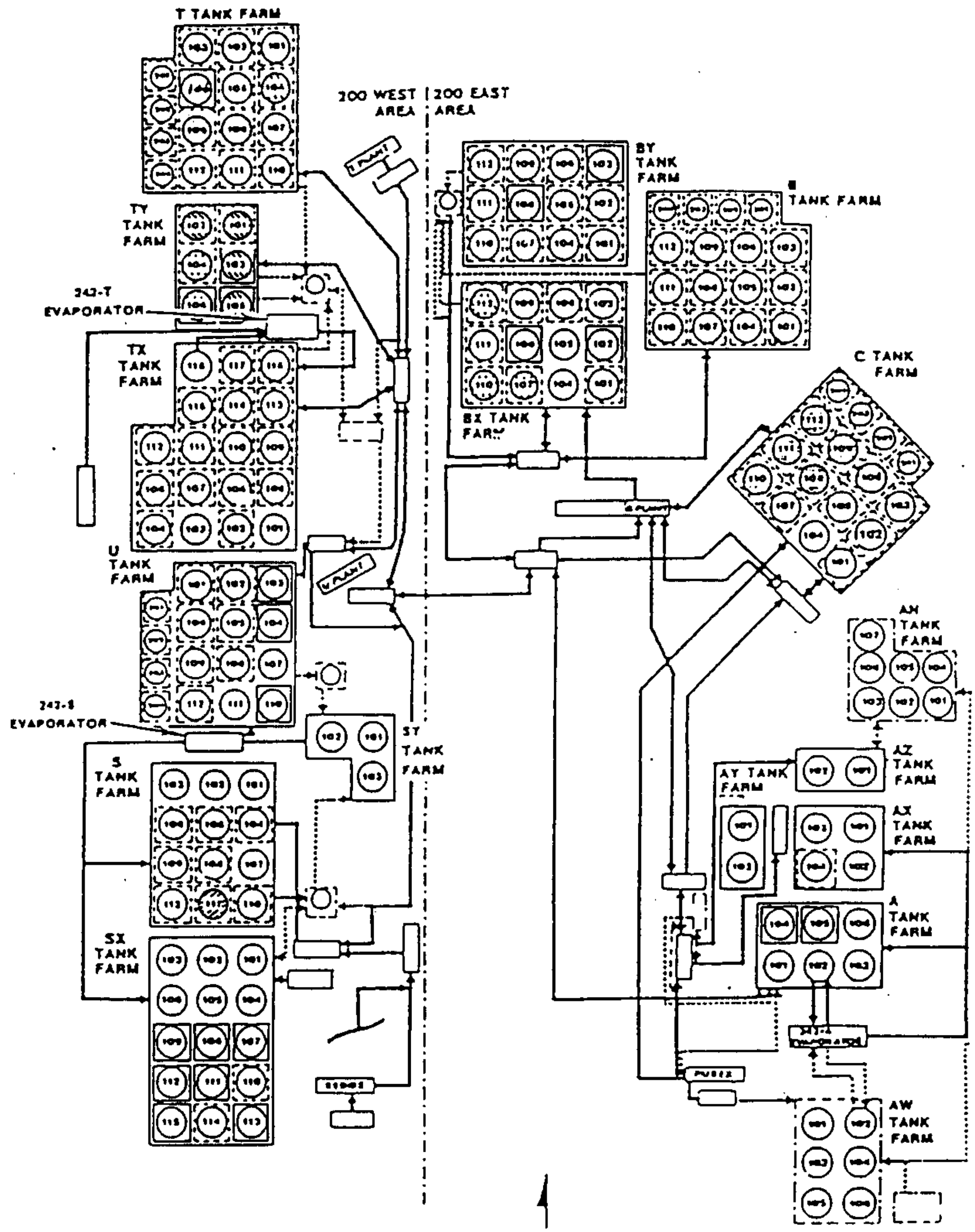


Figure 5-5. Schematic Diagram of the Waste Transfer Configuration of 200 East Area.

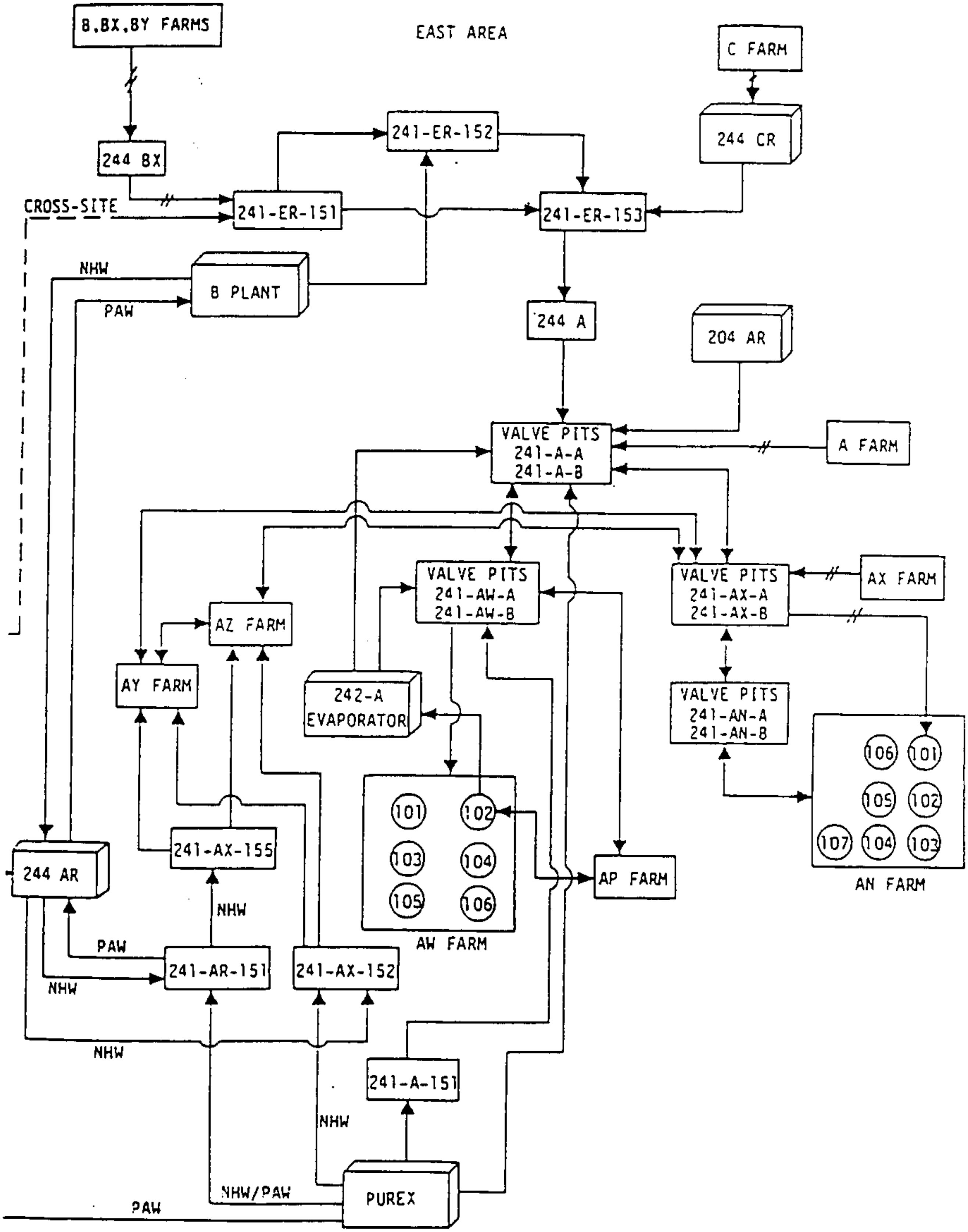


Table 5-3. Summary of Current Site Conditions for 200-PO-3. (sheet 1 of 2)

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-A-39	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-C-8	None	None	None	Gravel	2.0	None	could not locate	0	160
241-A-101	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-102	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-103	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-104	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-105	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-106	Chain Link Fence	Surface Contamination	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-A-152	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-A-153	Chain Link Fence	Surface Contamination	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-A-350	Chain Link Fence	Surface Contamination	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-A-417	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	could not locate	0	0
241-A-431	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-A-A	Chain Link Fence	None	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-A-B	Chain Link Fence	None	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-AR-151	Pipe Fence	Surf.+Underground+Cave-in	Posted on Structure	None/Unknown	0.0	None	None	0	0
241-AX-101	Chain Link Fence	Cave-in Potential	None	Sprayed Plastic Foam	0.0	None	Abuts Adjac. Site	0	0
241-AX-102	Chain Link Fence	Cave-in Potential	None	Sprayed Plastic Foam	0.0	None	Abuts Adjac. Site	0	0
241-AX-103	Chain Link Fence	Cave-in Potential	None	Sprayed Plastic Foam	0.0	None	Abuts Adjac. Site	0	0
241-AX-104	Chain Link Fence	Cave-in Potential	None	Sprayed Plastic Foam	0.0	None	Abuts Adjac. Site	0	0
241-AX-151	Light Chain	Surface Contamination	None	Sprayed Plastic Foam	0.0	None	None	0	0
241-AX-152CT	Chain Link Fence	None	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-AX-152DS	Chain Link Fence	None	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-AX-155	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-AX-501	Chain Link Fence	None	Posted on Structure	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-AX-A	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-AX-B	Chain Link Fence	Surface Contamination	None	None/Unknown	0.0	None	Inside Tank Farm	0	0
241-C-101	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-102	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-103	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-104	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-105	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-106	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-107	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-108	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0

Table 5-3. Summary of Current site Conditions for 200-PO-3.
(sheet 2 of 2)

241-C-109	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-110	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-111	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-112	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-C-151	Chain Link Fence	Surf. Contam. + Corrosive	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-C-152	Chain Link Fence	Surf. Contam. + Corrosive	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-C-153	Chain Link Fence	Surf. Contam. + Corrosive	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-C-201	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel	0.0	None	Inside Tank Farm	0	0
241-C-202	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel	0.0	None	Inside Tank Farm	0	0
241-C-203	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel	0.0	None	Inside Tank Farm	0	0
241-C-204	Chain Link Fence	Surf. Contam. + Corrosive	Posted on Fence	Gravel	0.0	None	Inside Tank Farm	0	0
241-C-252	Chain Link Fence	Surf. Contam. + Corrosive	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-C-301C	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
241-CR-151	Chain Link Fence	Surf. Contam. + Corrosive	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-CR-152	Chain Link Fence	None	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-CR-153	Chain Link Fence	None	None	Sprayed Plastic Foam	0.0	None	Inside Tank Farm	0	0
241-ER-153	Chain Link Fence	None	Posted on Structure	None/Unknown	0.0	None	Locked compound	0	0
2607-EO	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
2607-EG	Light Chain	Sani. Sewer Drainfield	None	Gravel	0.0	None	Supplied Air Zone	0	0
2607-EJ	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-100	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-107	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-115	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UN-200-E-118	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-16	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-18	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	None	0	0
UN-200-E-27	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-47	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-48	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-E-68	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-72	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-E-81	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-82	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UN-200-E-86	Light Chain	Underground Contamination	None	Gravel/Soil Cover	0.0	None	None	0	0
UN-200-E-91	None	None	None	Gravel/Soil Cover	0.0	None	None	0	0
UN-200-E-94	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-E-99	Chain Link Fence	Surf. Contam. + Corrosive	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
UPR-200-E-119	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UPR-200-E-125	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UPR-200-E-126	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UPR-200-E-136	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UPR-200-E-137	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UPR-200-E-59	None	None	None	None/Unknown	0.0	None	None	0	0

Table 5-4. Summary of Organic and Inorganic Contaminants in 200-PO-3..

Site	Fluoride (kg)	FeCN (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	Na Al (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-A-39	0	0	0	0	0	0	0	0	0	0	0	6	0	0
216-C-8	0	0	0	0	0	0	0	0	0	0	0	3	0	0

5.1 216-A-39 CRIB

This waste site is located directly north of the 241-AX tank farm, and immediately south of the 241-AZ tank farm, along Canton Avenue (Hanford drawing H-2-44501, Sheet 80). The site only received 20 L of floor drainage from the 241-AX-801-B building, which is a small building between the 241-AX-101 and 241-AX-105 tanks (Maxfield 1979; Hanford drawing H-2-44501, Sheet 89). The waste is expected to be low salt and contain high levels of cesium-137 (Brown et al. 1990).

A trench was dug and a hole was cut through the back of the 801 building, where a fire hose was inserted to wash the contamination into the trench (Maxfield 1979). The trench was then covered with soil (BHI 1994). At the present time the site is a level gravel-paved area with no markers of indications of a surface spill (site visit by authors, 1991).

5.2 216-C-8 FRENCH DRAIN

This drain is located about 75 ft southeast of the 241-C tank farm southeast perimeter fence, 250 ft east-northeast of the 241-CR vault (Maxfield 1979). The unit received the ion-exchange waste from the 271-CR building. The volume of the waste in unknown, however it is expected to contain less than 10 Ci total beta (Stenner et al. 1988). At the present time the drain is marked by a gooseneck pipe in a 10 ft by 10 ft area, stabilized with sand. The area is approximately 2 ft above grade and inside of the supplied air zone surrounding the 241-C tank farm (site visit by authors, 1991).

5.3 241-A TANK FARM

Tank farm 241-A consists of six buried SSTs that contain mixed waste. It is located approximately 1,300 ft northeast of the 202-A building, directly south of the 241-AX tank farm. The surface elevation of the tank farm is approximately 689 ft above mean sea level (amsl), and the depth to groundwater below the tank farm is approximately 287 ft (BHI 1994).

The tanks were placed in service during the mid-1950's and were retired in the early 1970's or 1980's (Table 5-2). They are numbered 241-A-101 through 241-A-106. All of the tanks are inactive at the present and each has undergone initial stabilization and has a status of either partial interim isolation or interim isolation (BHI 1994). Since all the tanks are of similar construction and are located adjacent to one another, their history will be discussed as a single topic.

At the present time the entire tank farm, including diversion boxes 241-A-151, 241-A-152, 241-A-A, and 241-A-B, and catch tank 241-A-350, is surrounded by a chain link fence, topped with three strands of barbed wire. The farms are covered with gravel. Surface contamination placards are placed on the chain link fence. In addition, a nylon cord, hung on steel posts, currently runs adjacent to the east perimeter fence (site visit by authors, September 1991).

These flat bottom, 1,000,000-gal capacity tanks are composed of a 32-ft-high, carbon-steel liner with a reinforced concrete shell, which has an inside height of 44 ft. All tanks in the 241-A tank farm are 75 ft in diameter and are fourth generation design (BHI 1994). Each tank bottom is 50 ft below grade and the tanks are covered with about 7 ft of overburden. Tank operating depth is 30 ft, leaving about 2 ft of freeboard (BHI 1994).

The tank farm was constructed to receive high-level, self-boiling waste from the PUREX plutonium recovery process, described in Section 2.1. The three major types of wastes contained in the tank farm are aluminum and zinc cladding waste, organic wash waste, and PUREX acid waste. Lessor quantities of several other types of waste were also deposited in the tank farm. These include waste fractionization waste, ion-exchange waste, sluicing waste, and waste generated by the waste solidification program, such as evaporator bottoms (BHI 1994). Section 2.3 of this report provides a more detailed description of the chemical composition of these waste streams. In addition, the vapors from the 241-A tanks are combined with those from the 241-AZ tanks and processed in the 241-AX facilities. The resultant condensate is routed to crib 216-A-24, or returned to 241-A or 241-AX tanks (BHI 1994).

Table 5-5 provides a breakdown of the quantities and specific waste currently stored in each tank. The table shows that about 2/3 of the waste stored in the tank farm is saltcake and only a minor amount of supernatant liquid and some interstitial liquid is available for infiltration through the vadose zone. Figure 5-6 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the 241-A tank farm. Note that the 241-A-103 tank has the greatest volume of stored waste in the tank farm and is also a potential leaker (BHI 1994).

The waste contained in the tanks can occur in three forms: sludge, saltcake, or liquid. Sludge is comprised primarily of insoluble metal hydroxides and hydrated oxides that precipitated from neutralized high-level waste solutions. Saltcake is comprised primarily of crystallized nitrate salts (particularly sodium nitrate), the majority being produced by waste concentration operations. The liquid wastes are aqueous solutions rich in sodium hydroxide and sodium aluminate, as well as sodium nitrate. Liquid waste can be present as supernatant or interstitial fluid (McKenney and Blevins 1983).

Several dry wells within the tank farm are used to monitor the soil for radioactivity, and serve as one form of leak detection. In addition, groundwater monitoring wells around the 241-A and other PUREX tank farms are also used to monitor subsurface conditions.

5.4 241-A-101 TANK

The soft solids in this tank are experiencing slurry growth (McCann and Vail 1984). The tank has a potential for hydrogen or flammable gas accumulation above its flammability limit. The tank has 13 active monitoring wells (BHI 1994).

5.5 241-A-102 TANK

This tank has seven active monitoring wells. These wells are used to measure groundwater levels and the level of certain particulate contaminates in the groundwater (BHI 1994).

5.6 241-A-103 TANK

This tank is an assumed leaker and has eight active monitoring wells surveying it (BHI 1994).

Table 5-5. Summary of 241-A Tank Farm Waste Volumes and Waste Streams.

Tank	Status	Supernatant Liquid (gal)	Sludge (gal)	Saltcake (gal)	Total Waste (gal)	Waste Stream	Supernatant Waste Stream
101	sound	0	3,000	950,000	953,000	1,2,3,4	S1, S2, S3, S4
102	sound	4,000	15,000	22,000	41,000	1,3,4	S1, S2, S3, S4, S5, S6
103	assumed leak	4,000	366,000	0	370,000	1,2,3,4,5	S1, S2, S3, S6, S7
104	confirm leak	0	28,000	0	28,000	1,2,3,4	S6
105	assumed leak	0	19,000	0	19,000	6	S2
106	sound	0	125,000	0	125,000	1,2,3,4,6	S1, S2, S8

Notes: Non-supernatant Waste Stream
1 = PUREX carbonate wash waste
2 = PUREX organic wash waste
3 = PUREX high-level waste
4 = B Plant high-level waste (Waste Fractionization)
5 = Waste fractionization ion exchange waste
6 = PUREX inorganic wash waste

Supernatant Waste Stream
S1 = B Plant high-level waste
S2 = PUREX high-level waste
S3 = Double-shell slurry feed
S4 = Complexed and noncomplexed waste
S5 = Evaporator waste
S6 = PUREX sludge supernatant
S7 = Waste fractionization ion exchange waste
S8 = Complexed concentrate

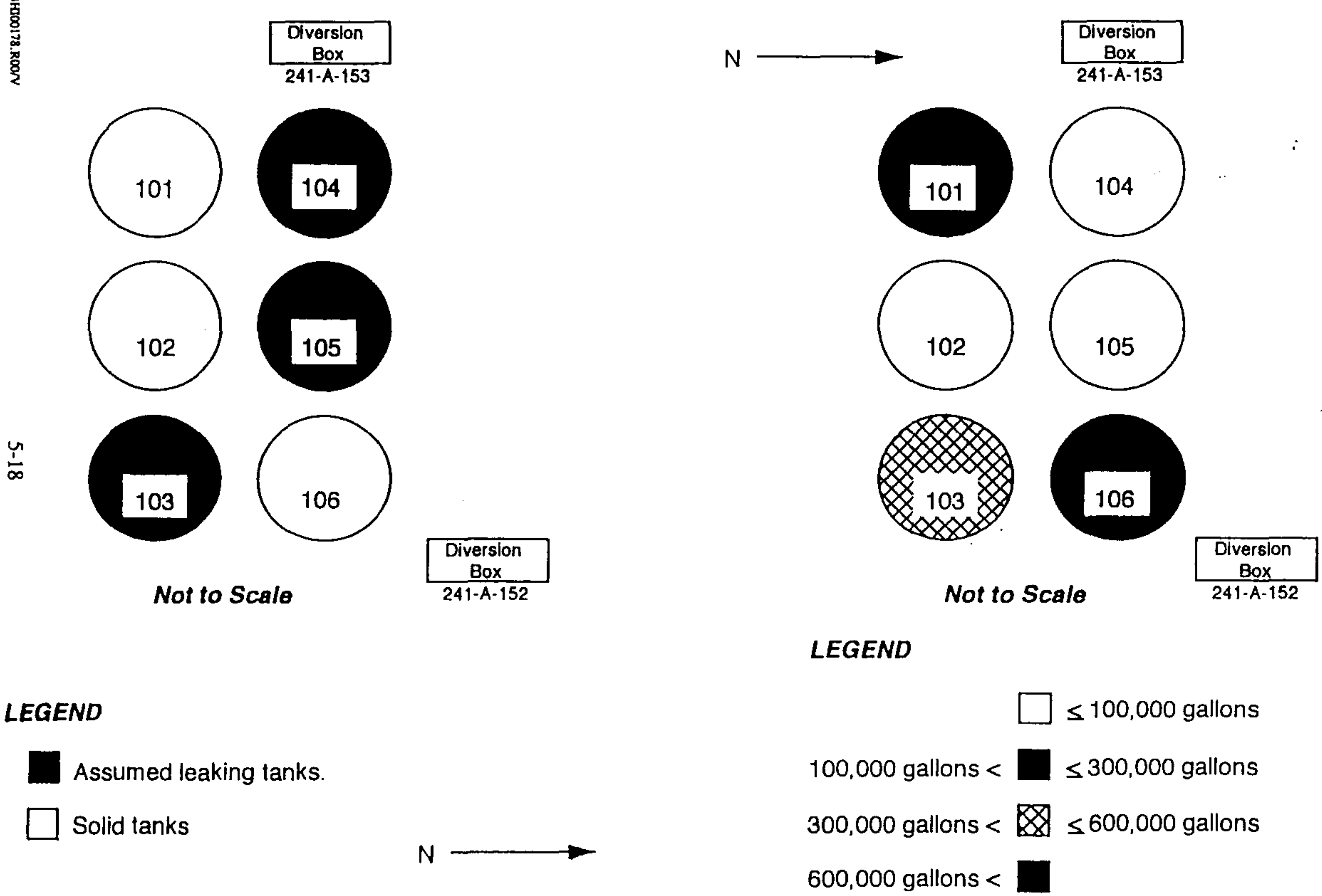


Figure 5-6. 241-A Tank Farm Tank Integrity and Waste Volumes.

5.7 241-A-104 TANK/UPR-200-E-125

Seven active wells monitor this tank. Tank 241-A-104 has a high heat load, estimated to be 50,000 BTU/h, based on a waste temperature of 187 °F, taken on June 27, 1991 (BHI 1994). The site has one UPR associated with it (UPR-200-E-125).

In May 1975, 2,500 gal of waste containing 18,000 Ci of cesium-137 with readings of 6,450 c/m leaked from the tank (UPR-200-E-125) (Cramer 1987). Occurrence Report 76-100, July 13, 1976, was issued to report radiation increases at two of the laterals, and evaluation indicated minor migration of the leak (Stalos and Walker 1977).

The tank was categorized as a confirmed leaker on April 16, 1975, and subsequently pumped down to a sludge heel. The basis for declaration of status was leak detection laterals indications of increasing radiation at several locations beneath the tank (Stalos and Walker 1977).

5.8 241-A-105 TANK/UPR-200-E-126

Storage tank 241-A-105 is classified as an assumed leaker. The tank has a high heat load of 50,000 BTU/h, based on a waste temperature measurement of 130 °F , taken on June 27, 1991. The UPR-200-E-126 occurred at this tank in 1963, after which the unit was suspected of leaking and taken out of service in December 1963. However, the tank was immediately returned to service and in January 1965, soon after the tank was filled, a sudden and severe steam release occurred. Investigation revealed that the bottom liner had bulged upward to a maximum elevation at one point of 8.5 ft, thus creating a void volume of about 80,000 gal. It is believed that the void space contained vapor plus supernatant but no appreciable quantity of sludge. Approximately 5,000 gal of waste are assumed to have leaked as a result of the tank deformation. The tank was pumped to a residual liquid heel and 1,000 gal of water were applied weekly to keep the sludge from overheating (Stalos and Walker 1977).

Seven active monitoring wells measure contaminant activity at this site. Dry well and lateral levels have appeared stable during the review period and are used primarily to track migration of existing radionuclides in the soil (Stalos and Walker 1977).

5.9 241-A-106 TANK

Eight active monitoring wells are associated with this tank. The tank is assumed to be sound and contains approximately 125,000 gal of sludge (BHI 1994).

5.10 241-A-152 DIVERSION BOX

The 241-A-152 diversion box is located about 150 ft east of the 241-A-103 and 241-A-106 tanks. The box routes waste from the 241-A-151 diversion box to the 241-CR-151 diversion box (Stalos and Walker 1977). The diversion box has been stabilized with plastic foam (site visit by authors, 1991). One of the primary purposes of the foam is to prevent surface infiltration into the diversion box.

5.11 241-A-153 DIVERSION BOX

The 241-A-153 diversion box is located about 209 ft southwest of the 241-A-104 tank. This unit routes waste from the 241-A tank farm to the 244-AR vault (Harmon et al. 1975). The diversion box has been stabilized with plastic foam (site visit by authors, 1991).

5.12 241-A-350 CATCH TANK

This active catch tank is located at the south end of the 241-A tank farm. The tank is associated with the 241-A-A and 241-A-B diversion boxes (Stalos and Walker 1977). Because of the numerous structures within the 241-A tank farm and the distance of this site from the tank farm perimeter fence, this site could not be distinguished from the 241-A-417 catch tank during a site visit by the authors (site visit by authors, 1991).

5.13 241-A-417 CATCH TANK

This active tank was placed just west of the 241-A-401 condenser building and south of the 241-AX tank farm. The unit collects condensate from the 241-A condenser house, and currently holds approximately 31,680 gal of 702-A process condensate. The unit is monitored by a dip tube (Stalos and Walker 1977). Because of the numerous structures within the 241-A tank farm and the distance of this site from the tank farm perimeter fence, this site could not be distinguished from the 241-A-350 catch tank during a site visit by the authors (site visit by authors, 1991).

5.14 241-A-A AND 241-A-B DIVERSION BOXES

These active units are associated with the 241-A-350 catch tank and 241-A tank farm (Cramer 1987).

5.15 241-AR-151 DIVERSION BOX

The 241-AR-151 diversion box is still active and is associated with the 241-AY and 241-AZ tank farms and the 244-AR vault (Cramer 1987). It is located east of the 244-AR vault. The lid is at grade and is painted white (site visit by authors, 1991).

5.16 241-AX TANK FARM

The 241-AX tank farm consists of four buried SSTs that contain mixed waste. It is located approximately 1,750 ft northeast of the 202-A building, east of the 241-AY tank farm, and between the 241-A and 241-AZ tank farm. The surface elevation of the tank farm is approximately 680 ft amsl, and the depth to groundwater below the tank farm is approximately 262 ft (BHI 1994).

Tanks were placed in service during the mid-1960's and retired in the early 1980's (Table 5-2). They are numbered 241-AX-101 through 241-AX-104. All the tanks are inactive presently and each has undergone initial stabilization and has a status of either partial interim isolation or interim isolation (BHI 1994). Since all the tanks are of similar construction and are located adjacent to one another, their history will be discussed as a single topic.

Currently, many structures in the tank farm, including diversion boxes 241-AX-151, 241-AX-152DS, and catch tank 241-AX-152CT have been stabilized. The tanks are covered with gravel, generally at the level of the surrounding grade (site visit by authors, September 1991).

Each tank has a 1,000,000-gal capacity. They are fifth generation, flat bottom tanks containing a 32.33-ft-high carbon-steel liner with a reinforced concrete shell that has an inside height of 45.5 ft. All tanks in the 241-AX tank farm are 75 ft in diameter (BHI 1994). Each tank bottom is 52 ft below grade and they are covered with about 6 to 7 ft of overburden. The tank operating depth is 31 ft (BHI 1994).

Table 5-6 provides a breakdown of the quantities and specific waste currently stored in each tank, clearly showing that the majority of waste stored in the tank farm is saltcake and only a minor amount of supernatant liquid, and some interstitial liquid, is available for infiltration through the vadose zone. Figure 5-7 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the 241-AX tank farm. Note, with the two tanks containing the most waste are not considered to be leaking (BHI 1994).

The waste contained in the tanks can occur in three forms: sludge, saltcake, and/or liquid. Sludge is composed primarily of insoluble metal hydroxides and hydrated oxides that precipitated from neutralized high-level waste solutions. Saltcake is comprised primarily of crystallized nitrate salts (particularly sodium nitrate), the majority being produced by waste concentration operations. The liquid wastes are aqueous solutions rich in sodium hydroxide and sodium aluminate, as well as sodium nitrate. Liquid waste can be present as a supernate or as an interstitial fluid (McKenney and Blevins 1983).

Several dry wells within the tank farm are used to monitor the soil for radioactivity, and serve as one form of leak detection. In addition, groundwater monitoring wells around the 241-A, 241-AX, 241-AY, and 241-AZ tank farms are also used to monitor subsurface conditions.

5.17 241-AX-101 TANK

The tank has eight active monitoring wells measuring for contamination. The soft solids in the tank are experiencing slurry growth (McCann and Vail 1984). In addition, the tank has a potential for hydrogen or flammable gas accumulation above its flammability limit. On June 29, 1991, the temperature of the waste contained in tank 241-AX-101 was 143 °F (BHI 1994).

5.18 241-AX-102 TANK

This tank has 10 active and one inactive monitoring wells (BHI 1994).

Table 5-6. Summary of 241-AX Tank Farm Waste Volumes and Waste Streams.

Tank	Status	Supernatant Liquid (gal)	Sludge (gal)	Saltcake (gal)	Total Waste (gal)	Waste Stream	Supernatant Waste Stream
101	sound	0	3,000	745,000	745,000	2,3,4,7,8	S3, S6, S9, S10
102	assumed leak	3,000	7,000	29,000	39,000	2,3,4,8	S1, S2, S4, S8
103	sound	0	2,000	110,000	112,000	2,3,4,6,8	S2, S6
104	assumed leak	0	7,000	0	7,000	2,3,4,6,8	S2, S6

Notes: Non-supernatant Waste Stream
1 = PUREX carbonate wash waste
2 = PUREX organic wash waste
3 = PUREX high-level waste
4 = B Plant high-level waste (Waste Fractionization)
5 = Waste fractionization ion exchange waste
6 = PUREX inorganic wash waste
7 = Fission product waste
8 = PUREX low-level waste

Supernatant Waste Stream
S1 = B Plant high-level waste
S2 = PUREX high-level waste
S3 = Double-shell slurry feed
S4 = Complexed and noncomplexed waste
S5 = Evaporator waste
S6 = PUREX sludge supernatant
S7 = Waste fractionization ion exchange waste
S8 = Complexed concentrate
S9 = Fission product waste
S10 = Organic wash waste

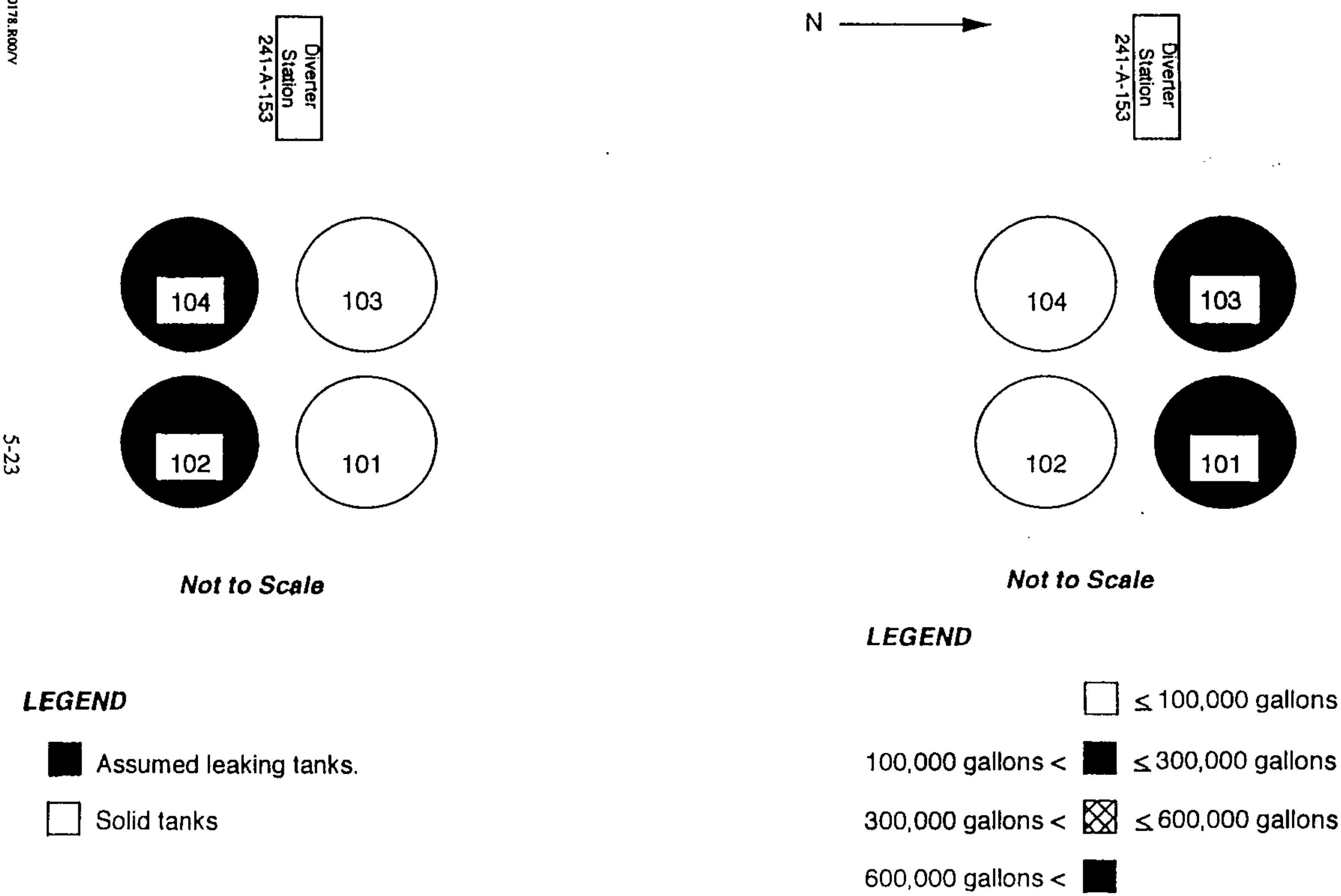


Figure 5-7. 241-AX Tank Farm Tank Integrity and Waste Volumes.

5.19 241-AX-103 TANK/UPR-200-E-115

This tank has six active monitoring wells associated with it (BHI 1994). In addition, the tank has a potential for hydrogen or flammable gas accumulation above its flammability limit. On June 29, 1991, the temperature of the waste contained in tank 241-AX-101 was 117 °F (BHI 1994).

UPR-200-E-115 occurred in February 1974, on the ground adjacent to the 241-AX-103 pump pit. During bleeding of air from a line, air flowed up (instead of down), causing contaminated liquid to spray on two employees and on the ground in an area within the 241-AX tank farm (Stenner et al. 1988).

5.20 241-AX-104 TANK/UPR-200-E-119

This unit was categorized as a questionable integrity in November 1977. Increasing activity in dry well 11-04-08 at 64 ft led to the current categorization. Through subsequent investigation, the source of the contamination has been determined to be the unit's 20-in. vapor line, at points above the unit, and at the line tied into the 24-in. vessel vent header (Stalos and Walker 1977).

UPR-200-E-119 occurred at this site on December 22, 1969, when an employee mistakenly pulled about 15 ft of a contaminated electrode cable out of the 241-AX-104 tank and set it on the ground. He then removed his contaminated gloves and set them on the ground. Contamination was limited to a small area near the 241-AX-104 tank, the employee, and the change house (Stenner et al. 1988).

The unit has seven active monitoring wells associated with it (BHI 1994).

5.21 241-AX-151 DIVERSION BOX

This active unit routes waste from the 202-A building to the 244-AR vault and the 241-AY and 241-AZ tank farms (Harmon et al. 1975). Both this diversion box and the aging 241-AX-801C catch tank are constructed above grade and are built on a 10-ft-high gravel mound, south of the 244-AR vault. The stabilized tops of these structures are visible from the top of the gravel mound (site visit by authors, 1991).

5.22 241-AX-152CT CATCH TANK AND 241-AX-152DS DIVERTOR STATION

The 241-AX-152CT catch tank and the 241-AX-152 diversion box are one and the same. The catch tank site number (i.e., 241-AX-152CT) is scheduled for deletion from BHI (1994).

Divertor station 241-AX-152DS is used to transfer mixed waste solutions from processing and decontamination operations. It currently holds about 2,656 gal of waste (Hanlon 1991).

5.23 241-AX-155 DIVERSION BOX

This unit is active and is associated with 241-AY and 241-AZ tank farms and the 241-AX-152 diversion box (Cramer 1987). It is located near the 241-AX and 241-AY tank farms dividing fence and has a pipe fence surrounding it (site visit by authors, 1991).

5.24 241-AX-501 VALVE PIT

This active unit interconnects the 241-AX tank farm to the 241-A-417 pump pit and tank, and receives and routes tank farm condensate (Harmon et al. 1975). It is located close to the south 241-AX tank farm perimeter fence and is painted white. The edges of the pit and the pit cover are taped over (site visit by authors, 1991).

5.25 241-AX-A AND 241-AX-B DIVERSION BOXES

These units are active and are associated with the 241-AY and 241-AX tank farms (Cramer 1987). The boxes are interconnected with the 241-AX-B valve pit, 241-A-A pit, 241-A-B pit, and the 242-A evaporator (Harmon et al. 1975). Neither of these diversion boxes is shown on Hanford drawing H-2-44501, Sheet 58, but their locations are shown on the tank operations board located in the 272-AW building. The BHI (1994) coordinates appear to be correct. The top of the diversion boxes are at the same elevation as a concrete pad that has been raised approximately 2 ft above the tank farm grade (site visit by authors, 1991).

5.26 241-C TANK FARM

Sixteen buried SSTs make up the 241-C tank farm. It is located approximately 3,000 ft north of the 202-A building, and 500 ft northwest of the 241-AN tank farm. The surface elevation of the tank farm is approximately 645 ft amsl, and the depth to groundwater below the tank farm is approximately 243 ft (BHI 1994). The tanks are covered with gravel, generally at the level of the surrounding grade (site visit by authors, September 1991).

The tanks were placed in service during the mid-1940's and retired in the late-1970's to mid-1980's (Table 5-2). They are numbered 241-C-101 through 241-C-112, and 241-C-201 through 241-C-204. Currently, all the tanks are inactive and each has undergone initial stabilization and has a status of either partial interim isolation or interim isolation (BHI 1994). Since all the tanks are of similar construction and are located adjacent to one another, their history will be discussed as a single topic.

Four of the tanks (241-C-201 through 241-C-204) have a capacity of 55,000 gal. The remaining 12 tanks (241-C-101 through 241-C-112) have individual capacities of 533,000 gal. All are first generation tanks. These tanks have a designed operating depth of 17 ft and were constructed to receive nonboiling wastes. Each tank is composed of a high-carbon steel liner with a reinforced concrete shell (BHI 1994).

The tanks are arranged in groups of three that cascade from the southwest to the northeast (Hanford drawing H-2-1744) so that the bulk of the solid waste is contained in the first tank of a cascading series. Cooling of the waste material and precipitation, as well as gravity settling of particulate material, occur in each tank. Thus, the bulk of the radionuclides collect in the bottom of a tank. Air-cooled reflux condensers were installed to prevent the heating-up of the wastes. The condensate from the condensers was returned to the tank and any noncondensible gases were vented directly to the atmosphere (Stenner et al. 1988; BHI 1994).

The waste stream received by the tank farm was generated largely from the bismuth phosphate process used in the 221-B building, which operated until 1956. During this time period small amounts of waste from Semiworks, building 201-C, were also sent to the tank farm. Semiworks was build in 1949 and used as a pilot plant for the reduction oxidation process development, and later for "bench scale" PUREX process development. Laboratory wastes from the Critical Mass Laboratory, building 209-E, were also sent to the 241-C tanks (BHI 1994).

Wastes from the TBP solvent-extraction process, performed at U Plant, was also sent to the 241-C tank farm (BHI 1994). Between 1956 and 1972 the PUREX plutonium recovery process operated at U Plant and some of the organic wash waste and coating waste from this extraction process was routed to the tank farm. In addition, all the wastes from the two thorium campaigns run at PUREX, one in 1966 and another in 1970, were sent to the 241-C tank farm (BHI 1994).

Waste contained in the tanks occurs in three forms: sludge, saltcake, or liquid. The waste compositions are similar to that found in other farms. The majority of waste stored in the tank farm is saltcake and only a minor amount of supernatant liquid and some interstitial liquid is available for infiltration through the vadose zone. Figure 5-8 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the 241-C tank farm (BHI 1994).

Several dry wells within the tank farm are used to monitor the soil for radioactivity, and serve as one form of leak detection. In addition, groundwater monitoring wells around the area are also used to monitor subsurface conditions.

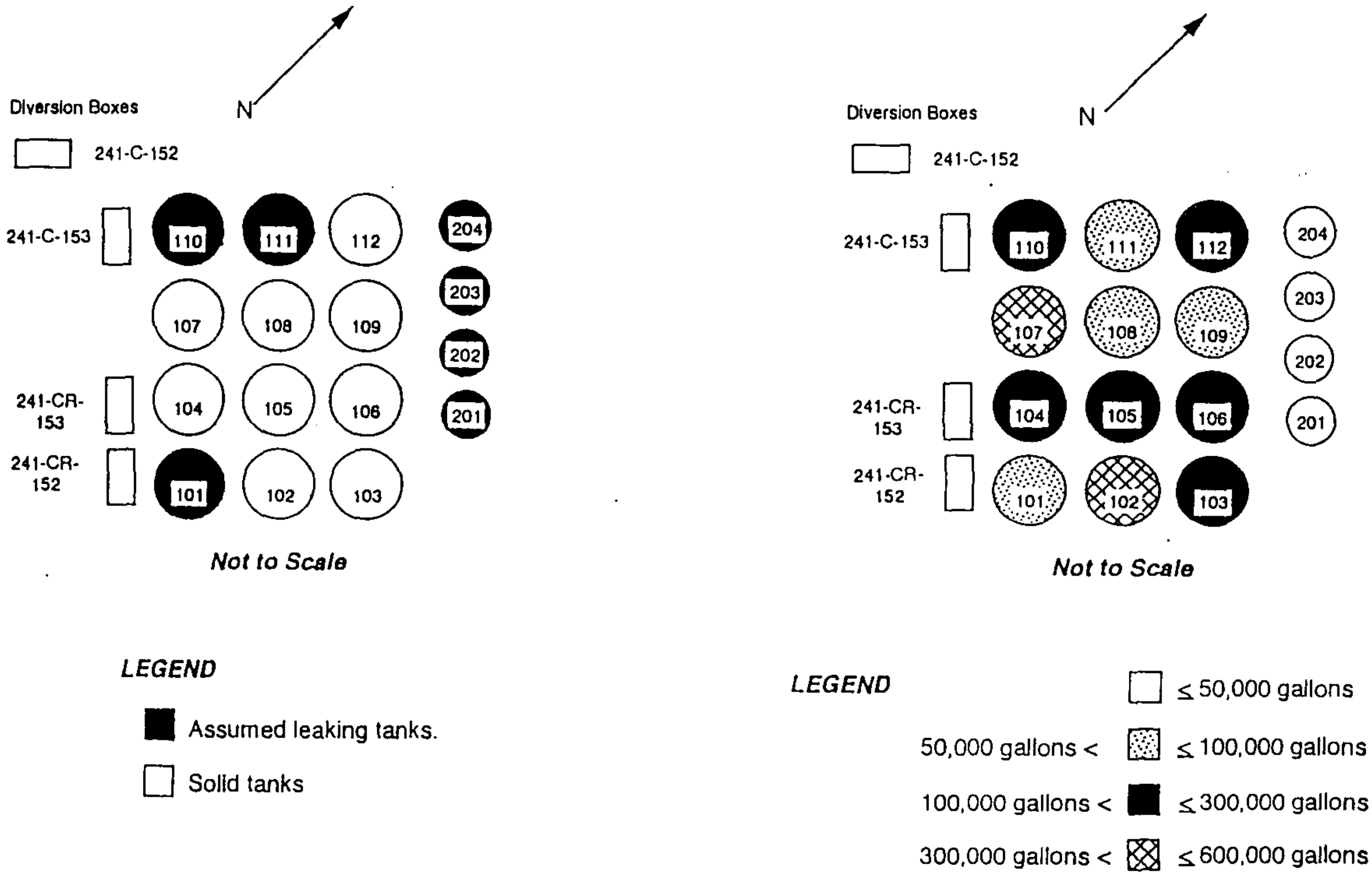
5.27 241-C-101 TANK/UPR-200-E-136

UPR-200-E-136 occurred at this tank from 1946 to 1970. The unit apparently lost about 17,000 to 24,000 gal of waste containing 2,000 Ci (Cramer 1987). Because of the liquid level decrease, the unit was pumped to a minimum heel of 44 in. in December 1969 and was categorized questionable integrity in 1970 (Cramer 1987). In January 1980, the tank was re-categorized as a confirmed leaker (Stalos and Walker 1977).

The unit is equipped with a P-10 saltwell system, and a program for removal of interstitial liquid has been completed. The last pumping was completed in April 1979 (Stalos and Walker 1977).

5.28 241-C-102 TANK

This site has no active monitoring wells, and the P-10 saltwell pumping was completed in June 1978 (Cramer 1987).



A. Schematic diagram depicting individual tank integrity.

B. Schematic diagram depicting the quantity of total waste by individual tank in the C Tank Farm.

Figure 5-8. 241-C Tank Farm Tank Integrity and Waste Volumes.

5.29 241-C-103 TANK

The 241-C-103 tank has five active monitoring wells associated with it. The tank contains greater than 10 weight percent total organic carbon and organic salts (BHI 1994). Since 1987, problems have occurred with organic compound vapors escaping from this tank. In September 1991, three employees became ill while installing insulation on carbon filters. Employees are now required to wear self-contained breathing apparatuses in the vicinity of this site and monitoring and assessment is continuing (anonymous 1991)

5.30 241-C-104 TANK

This unit has seven active monitoring wells associated with it. Dry wells around this tank have remained stable during the review period and are now the primary means of leak detection (Stalos and Walker 1977).

5.31 241-C-105 TANK

Raw water was periodically added to facilitate evaporative cooling (McCann and Vail 1984). Temperature control by use of water was discontinued in April 1984 to allow evaporation of the liquid cover as part of a process test being conducted by TF&EPE (Stalos and Walker 1977).

This unit has eight active monitoring wells associated with. All have remained stable during the last review period (Stalos and Walker 1977).

5.32 241-C-106 TANK

Six active wells monitor this unit. As with 241-C-105 tank, raw water was added periodically to facilitate evaporative cooling (McCann and Vail 1984).

5.33 241-C-107 TANK

Because of solids, dry wells are the only means of leak detection and readings have remained stable for this unit during the last review period. A P-10 saltwell system to remove the interstitial liquid has been completed. Seven active wells monitor this unit (Stalos and Walker 1977).

5.34 241-C-108 TANK

A P-10 saltwell system was installed in February 1976 to remove interstitial liquid, and was completed in June 1978. This unit was interim isolated on December 15, 1982, and interim stabilized in March 1984 (Stalos and Walker 1977). Three active wells monitor this unit (BHI 1994).

5.35 241-C-109 TANK

This unit had a saltwell pumping project completed on April 1979. The unit was interim isolated on December 15, 1982, and interim stabilized on November 29, 1983 (Stalos and Walker 1977). The unit has six active monitoring wells (BHI 1994).

5.36 241-C-110 TANK

This tank has six active monitoring wells and has had saltwell pumping done to remove interstitial liquid (Stalos and Walker 1977).

5.37 241-C-111 TANK

The unit was categorized as questionable integrity in 1968 on the basis of a liquid-level decrease. The monitoring of dry wells is the only means of leak detection since the supernatant is now removed. Radiation profiles have remained stable during the review period (Stalos and Walker 1977). This tank contains 10 to 30 moles of ferrocyanide (BHI 1994).

The tank has had saltwell pumping performed and has been interim stabilized and isolated (Stalos and Walker 1977).

5.38 241-C-112 TANK

This tank contains 50 to 70 kgs moles of ferrocyanide (BHI 1994).

Because the tank contains solids, dry wells are the only means of leak detection. The tank has been interim stabilized and has had saltwell pumping performed (Stalos and Walker 1977).

5.39 241-C-151 DIVERSION BOX

This unit is located about 3,000 ft north of the 2092-A building, inside the 241-C tank farm, near the southwest corner (Hanford drawing H-2-34761). The box interconnects 241-C-153, 241-C-152, and 241-CR-151 diversion boxes (Harmon et al. 1975). The diversion box has been stabilized with weatherproofing foam (site visit by authors, 1991).

5.40 241-C-152 DIVERSION BOX

The 241-C-152 diversion box is located in the west corner of the 241-C tank farm (Hanford drawing H-2-44501, Sheet 92). It is north of the 241-C-151 diversion box and has been stabilized with weatherproofing foam (site visit by authors, 1991). The waste unit interconnects the 241-B-154 and 241-B-153 diversion boxes and 241-C tank farm (Harmon et al. 1975). A break in the line leading from tank 241-C-105 to this diversion box created UPR UN-200-E-82 (see Section 5.66) (BHI 1994).

5.41 241-C-153 DIVERSION BOX

The box was established west of the 241-C-107 and 241-C-110 tanks. This unit interconnects the 241-C-151 and 241-C-152 diversion boxes (Harmon et al. 1975).

5.42 241-C-201 TANK

The site has no active monitoring wells, and dry well 30-00-01 has remained stable during the last review period (Cramer 1987).

5.43 241-C-202 TANK

The tank has no monitoring wells, and dry wells have remained stable during the last review period (Cramer 1987).

5.44 241-C-203 TANK/UPR-200-E-137

This tank was categorized as being inactive and sound and was designated for no future use in April 1976. The manual tape liquid level readings were of limited use for leak detection after pump-down in October 1980 because the manual tape plummet was contacting solids.

UPR-200-E-137 occurred at this tank. It was caused by natural water entering the tank over a 2- to 3-year time period and migrating through the saltcake, and either becoming entrained in the saltcake or leaking out (Cramer 1987). It is believed that 400 gal leaked from the tank (Cramer 1987). In December 1982, it was categorized as interim isolated. Since that time, liquid level measurements have shown a gradual liquid level decrease of about 3 in. In May 1984, the unit was judged to be a confirmed leaker (Stalos and Walker 1977).

5.45 241-C-204 TANK

This unit has two active monitoring wells (Stalos and Walker 1977).

5.46 241-C-252 DIVERSION BOX

This unit is located northwest of the 241-C-104 tank (BHI 1994) and interconnects the 241-C-151 diversion box and the 241-C tank farm (Harmon et al. 1975). It has been sealed with weatherproofing foam (site visit by authors, 1991).

5.47 241-C-301C CATCH TANK

The 241-C-301C catch tank is located southwest of the 241-C-252 diversion box and west of the 241-C-204 tank (BHI 1994). It is located near the southwest fence of the 241-C tank farm (site visit by authors, 1991). This catch tank is interconnected with the 241-C-151, 241-C-152, 241-C-153, 241-C-252 diversion boxes and the 241-C tank farm (Harmon et al. 1975). The unit was isolated in 1985 (Hanlon 1991) and is marked at the surface by two sets of 4-in.-diameter stubbed pipes, approximately 2 ft high.

5.48 241-CR-151 DIVERSION BOX

This box is located between the 241-CR-152 and 241-CR-153 diversion boxes and the 244-CR vault (BHI 1994).

5.49 241-CR-152 DIVERSION BOX

Located northwest of 241-C-151 this box is interconnected to both the 241-CR-151 diversion box and all the tanks of the 241-C tank farm (Hanford drawing H-2-44501, Sheet 91). The box has been isolated and weather covered (Cramer 1987; site visit by authors, 1991).

5.50 241-CR-153 DIVERSION BOX

This unit adjoins the 241-C-152 diversion box, located northwest of 241-C-151. The box is stabilized with weatherproofing foam (site visit by authors, 1991).

5.51 241-ER-151 DIVERSION BOX

This active unit is located about 400 ft south of 7th Street (BHI 1994) and is associated with the 244-A lift station (Cramer 1987). It is within the same fenced compound as the lift station and has a steel pipe barricade surrounding it (site visit by authors, 1991).

5.52 2607-ED SEPTIC TANK

The 2607-ED septic tank is located inside the 241-AX tank farm, north of the 2707-AX building (Bovay 1991; Hanford drawing H-2-44501, Sheet 69). The tank and drain field are active and accept sanitary sewage and wastewater at the estimated rate of 0.28 m^3/d (Cramer 1987). A metal sign on a temporary post marks the site (site visit by authors, 1991).

5.53 2607-EG SEPTIC TANK

An active septic tank, 2607-EG, is located on the southeast side of the 241-C tank farm. It is inside the supplied-air working zone. The tank is marked by a large diameter, vertical concrete pipe. The drain field, which is at grade, is covered with gravel (site visit by authors, 1991). Both the tank and drain field accepted sanitary wastewater and sewage at the estimated rate of 0.17 m/d (Cramer 1987).

5.54 2607-EJ SEPTIC TANK

Septic tank 2607-EJ is located on the east side of the 241-AW tank farm, near the perimeter fence. The septic tank is marked by a 2-ft-high concrete pipe with a yellow steel lid. A wooden barricade surrounds it (site visit by authors, 1991). Sanitary wastewater and sewage are discharged to it at the estimated rate of 0.32 m^3/d (Cramer 1987).

5.55 UN-200-E-16 UNPLANNED RELEASE

In 1959, the 241-C-105 to 241-C-108 aboveground transfer line broke and contaminated the soil 60 ft northeast of the 241-C-105 tank pit with PUREX coating waste (Stenner et al. 1988).
The contaminated pipe was buried in a trench near the 241-C fence. The original site was marked with chain and underground radiation zone signs (Stenner et al. 1988). At the present time there are no separate markers to indicate the spill area or where the lines were buried (site visit by authors, 1991).

5.56 UN-200-E-18 UNPLANNED RELEASE

In 1959, moisture was noticed dripping from a vent pipe bonnet at the A-8 proportional sample pit and contaminated an area about 100 ft east of the 241-A-271 building. The sample pit is located at the corner of Canton Avenue and the 241-A tank farm entrance. The waste contained low-level fission products (Stenner et al. 1988). The sample pit is cordoned off with light chain and posted with surface contamination placards (site visit by authors, 1991).

5.57 UN-200-E-27 UNPLANNED RELEASE

On November 1, 1960, during work in the 241-CR vault, winds spread contaminated particles from the vault generally east and out to several hundred ft beyond the perimeter fence. The contamination had unknown beta/gamma with readings near the vault on the order of 50 to 100 mR/h. Readings outside the fence were up to 40,000 c/m (Stenner et al. 1988). There are no separate markers at the present time, either inside the 241-C tank farm or in the vicinity beyond the perimeter fence, indicating a hazard (site visit by authors, 1991).

5.58 UN-200-E-47 UNPLANNED RELEASE

On October 15, 1974, contaminated soil was detected in the parking lot east of the 702-A building. The contamination had unknown beta/gamma with readings of 500 to 20,000 c/m. The soil was removed and the area released for normal service (Stenner et al. 1988). At the present time the parking lot is not barricaded or posted with warning signs (site visit by authors, 1991).

5.59 UN-200-E-48 UNPLANNED RELEASE

At the completion of installation of a pump in the 216-A-106 pump pit, contamination with unknown beta/gamma with readings of 1,000 to 2,000 c/m were found on the 241-A tank farm parking lot.

The parking area was cleaned and returned to normal operation (Stenner et al. 1988). At the present time the parking lot is not barricaded or posted with warning signs (site visit by authors, 1991).

5.60 UN-200-E-68 UNPLANNED RELEASE

On January 11, 1985, wind-borne contamination spread from the 241-C-151 diversion box to the general vicinity of the 244-AR vault and 241-C tank farm. The contamination consisted of unknown beta/gamma, with readings of 2,000 c/m and dose rates of 5 R/h on the diversion box (Cramer 1987).

The affected areas were either decontaminated to background radiation levels or covered for later decontamination. The 241-C-151 diversion box was opened, flushed, and sprayed with fabri-film, which is used to fix contamination to a solid surface (Cramer 1987). The area southwest of the tank farm, across 7th Street, was reportedly scraped following this release (BHI 1994).

No separate contamination barriers are present inside the 241-C tank farm, or around the 244-AR vault. The 241-C-151 diversion box has been weatherproofed (site visit by authors, 1991).

5.61 UN-200-E-70 UNPLANNED RELEASE

On October 15, 1984, contamination from an inline jumper heater that was being removed from the 244-A lift station was spread across a 1,500 ft^2 area (Environmental Assurance Files). This UPR consisted of 1,000 to 50,000 c/m of unknown beta/gamma contamination with a single isolated spot measuring 100,000 c/m. The area was decontaminated to background radiation levels and stabilized (BHI 1994).

The site lies within the surface contamination zone associated with the UN-200-E-100 release. It is surrounded by a chain link fence with a light chain barricade. The site is covered with gravel and has about a 40% vegetative cover of brush and native grass. There are no markers identifying the spot (site visit by author, 1991).

5.62 UN-200-E-72 UNPLANNED RELEASE

On April 20, 1985, buried waste was excavated in an area south of the 241-C tank farm. The waste had readings of 7 R/h with unknown beta/gamma. The source of the contamination was stabilized with fabri-film, and the area was chained off and posted as a radiation zone (Cramer 1987).

The site coordinates listed in BHI (1994) suggest a location near the 216-C-8 french drain. This area is near the area cordoned off, requiring supplied air, but there are no other chained zones in the immediate vicinity. Four posts marked "underground contamination" form a square near the 241-C tank farm perimeter fence (site visit by authors, 1991).

5.63 UN-200-E-81 UNPLANNED RELEASE

In October 1969, a puddle of contaminated liquid was discovered near the 241-CR-151 diversion box. The source was determined as the underground transfer line from the 202-A building to the 241-C-102 waste storage tank via that diversion box (Maxfield 1979).

Approximately 136,274 L of PUREX coating waste was lost to the soil, including 360 Ci of strontium-90, 720 Ci of cesium-137, 360 Ci of cerium-144, 1,088 Ci of zirconium-95, and 1,080 Ci of ruthenium-103 (Stenner et al. 1988). A radiological survey on October 1975 showed surface contamination of 10,000 to 100,000 c/m (Morton 1980). The contaminated area was covered with backfill and clean gravel (Maxfield 1979). The diversion box has been covered with weatherproofing foam and there are no separate barriers indicating the location of the release (site visit by authors, 1991).

5.64 UN-200-E-82 UNPLANNED RELEASE

On December 19, 1969, a leak was discovered near the 241-C-152 diversion box, the source was determined as the feed line that runs from the 241-C-105 tank to the 221-B building. The leak was believed to originate at a flange, located at a 36° bend in the line immediately south of the diversion box. The leak waste stream flowed through a surface area of about 1 ft^2 northeastward, downgrade, until it pooled into an estimated 5 ft^2 area outside the tank fence line (Tanaka 1971). The leak consisted of 9,842 L of waste containing 100 Ci of cesium-134, 11,300 Ci of cesium-137, 260 Ci of cerium-144, 260 Ci of zirconium-95, and 130 Ci of ruthenium-103 (Stenner et al. 1988).

Ten wells were drilled to depths of 30 ft, surrounding the leak. A sample taken from one of these wells had a reading of 110 R/h (Tanaka 1971). There is no separate barrier surrounding this diversion box. However, a large spoil pile and a thick layer of gravel, both chained off, were observed at the site of the leak. The radiation warning zone outside the fence where the liquid pooled has been removed (environmental protection hardfiles, 216-E-10) (site visit by authors, 1991).

5.65 UN-200-E-86 UNPLANNED RELEASE

During routine line monitoring in March 1971 near the southwest corner of the 241-C tank farm, a radiation zone was detected in the vicinity of line number 812, which is used to transfer process waste from the 244-AR vault to the 241-C tank farm (Maxfield 1979). This line is approximately 8 ft below grade (BHI 1994). The spill consisted of waste from the process transfer line containing 25,000 Ci of cesium-137 (Harmon et al. 1975). Test wells driven into the ground indicated the contamination did not extend below a depth of 20 ft (Maxfield 1979).

In September 1991, radiation surveys performed by health physics personnel, found radiation levels to be below detection limits. However, up to 6,000 c/m beta was found in 1988 and 6,000 dis/min measurements were obtained at the site in 1989 (environmental protection hardfiles).

5.66 UN-200-E-91 UNPLANNED RELEASE

This UPR resulted from the migration of low-level radioactivity from the neighboring 241-C tank farm. At one time, wastewater from the equipment decontamination station inside the tank farm seeped downhill to the affected site. Vapor emissions and windblown particulate matter from the contaminated surfaces of the tank farm contributed to the buildup of ground contamination along the northeast corner of the 241-C tank farm. The actual occurrence date is unknown, but the site was posted in September 1980 (Maxfield 1981).

Beginning January 26, 1981, the contaminated soil was removed from the area and placed in the excavation adjacent to the north side of the 216-A-24 crib. The area was seeded with drought resistant grasses and has been released from radiation zone status (Maxfield 1981). Currently, the area northeast of the 241-C tank farm is not barricaded and has little vegetation. Parallel to the fence, and about 2 ft outside it, is a light chain barricade posted with surface contamination placards (site visit by authors, 1991).

5.67 UN-200-E-94 UNPLANNED RELEASE

The Radiation Monitoring Department was informed in June 1979 that moisture was being encountered in the excavation east of the 200 Area east perimeter fence adjacent to the 216-A-24 crib, where fill dirt was being obtained for the 241-AN tank farm. Follow-up surveys revealed beta contamination to a maximum of 8,000 c/m in the moisture on the earthmoving equipment and in the newly hauled-in soil around the 241-AN tanks (Maxfield 1981). The contaminated earth moving equipment was taken to the large gravel pit north of the 216-B-3 ditch diverter station, where it was decontaminated (Maxfield 1981).

The decontamination site is UN-200-E-94, which was assigned the designation UN-216-E-22 by environmental protection (environmental protection hardfiles). The area near the 216-B-3-1 and 216-B-3-2 ditches has been backfilled and posted with underground contamination warning signs. However, the gravel pit at UN-200-E-94 has been obliterated by heavy construction in the area. There is no posting in that area (site visit by authors, 1991).

5.68 UN-200-E-99 UNPLANNED RELEASE

This UPR occurred when a portion of the ground surface surrounding the 241-CR vault became contaminated during the numerous piping changes associated with that facility (BHI 1994). The actual date of the occurrence is unknown, however it was established as a site in September 1980.

The site was decontaminated during the summer of 1981 and released from zone posting (Maxfield 1981). Currently there are no separate barriers surrounding the vault. It is located inside the 241-C tank farm (site visit by authors, 1991).

5.69 UN-200-E-100 UNPLANNED RELEASE

In 1985, an 8.5 acre area north and west of the 244-A lift station was found contaminated with radioactive rodent feces and spotty contamination, up to 50,000 c/m (BHI 1994). Sources of the contamination were suspected to be either a line break around the lift station, or radioactive construction debris piled southwest of the list station (Cammann 1985). Myers (1985) directed that the soil be removed and placed in the excavation on the north side of the 216-A-24 crib, located in Operable Unit 200-PO-5. Recent surface surveys show that in September 1991, spots (animal feces?) of contamination, up to 5 mR/h were found (environmental protection hardfiles).

Currently, a surface contamination zone extends from the 216-A-40 trench west to the head of the powerhouse ditch, follows the southeast bank of the ditch for approximately 60 ft, cuts northwest for approximately 80 ft, and then heads northeast to the southwest corner of the lift station. This encloses several spoil piles that contain unidentified debris. A new nylon rope barricade, posted with surface contamination signs, has been added to the north side of the light chain barricade. Numerous small yellow surface contamination flags are visible (site visit by authors, 1991).

5.70 UN-200-E-107 UNPLANNED RELEASE

On November 26, 1952, during a transfer pump installation at the 241-CR-100 tank, about 19 L of TBP waste was discharged to the ground before the pump could be shut off. A maximum dose of 4.2 R/h at the surface and 200 mR/h at a depth of 2 in. was observed (Stenner et al. 1988). No separate barriers are presently surrounding the tank (site visit by authors, 1991).

5.71 UN-200-E-118 UNPLANNED RELEASE

On April 20, 1957, the 241-C-107 effluent tank released airborne contamination inside the 241-C tank farm fence, 100 to 300 yd north of the badge house and to the south bank of the parking lot outside the fence (Stenner et al. 1988). The contamination had readings to 3,000 c/m. The highest dose rate at the surface was estimated at 50 mR/h, with one particle deposited per square foot (Stenner et al. 1988). No separate barriers or warning signs are posted in the parking lot or tank farm to indicate this release (site visit by authors, 1991).

6.0 OPERABLE UNIT 200-PO-4

Operable Unit 200-PO-4 is located outside the 200 East Area perimeter fence, immediately south of the Grout Treatment Facility (Figures 1-1 and 5-2). A graphical summary of the operational history of the individual sites is presented in Figure 6-1. Site locations and waste types for Operable Unit 200-PO-4 are provided in Table 6-1. The starting and stopping dates for each site are listed in Table 6-2.

Three active cribs, one inactive crib, one active retention basin, and one active septic tank are in this operable unit. Cribs 216-A-30, 216-37-1, and 216-37-2, all active, contain low-level waste. Although the three active cribs have received significant quantities of waste they have not been scored as a migration hazard. Inactive crib 216-A-6 received a migration hazard score of 47.82 (Table 4-2; Stenner et al. 1988).

Table 6-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November 1991. A list of the organic and inorganic contaminants that were part of the waste disposed in the area is given in Table 6-4. It should be used as a guideline only.

6.1 216-A-6 CRIB/UPR-200-E-21, UPR-200-E-29

This unit was established outside the 200 East Area perimeter fence, 1,000 ft east of the 202-A building and 250 ft east of Canton Avenue (Maxfield 1979). Until January 1961, the site received steam condensate, equipment disposal tunnel floor drainage, water-filled door drainage, and the slug storage basin overflow waste from the 202-A building. The crib was inactive from January 1961 to March 1966. After March 1966, the site again received the above effluents; a total of 3,400,000,000 L of low-salt neutral waste thought to contain cesium-137, ruthenium-106, and strontium-90 (Stenner et al. 1988).

The site was deactivated by blanking the effluent pipeline to the unit in distributor box #1. The radiation zone denoting this site was enlarged to include the contaminated ground surface northeast of the unit (Maxfield 1979).

UPR-200-E-21 occurred on March 20, 1959. An overflow from the crib contaminated the soil adjacent to the crib, with unknown beta/gamma readings to 500 mR/h (Cramer 1987). On January 20, 1961, UPR-200-E-29 occurred. This release was also an overflow from the crib with unknown beta/gamma with readings to 30 R/h at 4 ft (Cramer 1987). After both incidents, the ground surface was covered with 6 in. of sand and topped with plastic sheeting. The sheeting was covered with 18 in. of sand and 4 in. of gravel in July 1972. In November 1972, the five liquid level risers were cut off about 2 ft below grade and filled with concrete (Maxfield 1979). Currently, the crib and valve station on the southwest side are enclosed in a wood and box-wire fence. The valve station has a light chain barricade with surface contamination placards posted. The crib is posted with both surface and underground radiation contamination warning signs (site visit by authors, 1991).

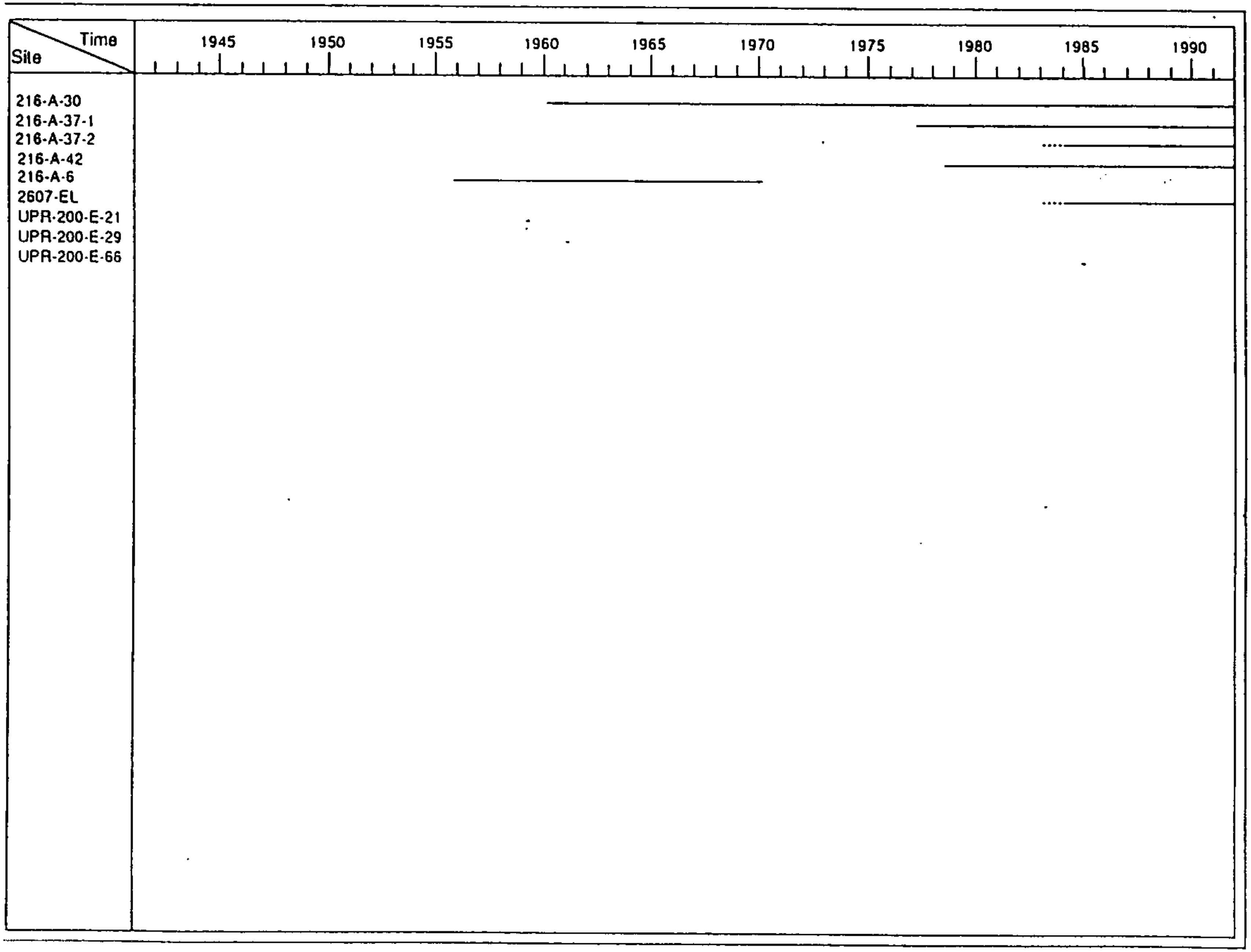


Figure 6-1. Summary of Operational Periods for Operable Unit 200-PO-4.

Table 6-1. Site Location and Waste Type for Operable Unit 200-PO-4.

Site	Type of Site	Status	Coordinates	Type of Waste
216-A-30	Crib	Active	N39150 W44990, N39735 W46260 (centerline)	Low-Level Waste
216-A-37-1	Crib	Active	N39856 W45816, N40157 W46449 (centerline)	Low-Level Waste
216-A-37-2	Crib	Active	N39118 W44414, N39791 W45678 (centerline)	Low-Level Waste
216-A-42	Retention Basin	Active	N40179 W46749, N39900 W46500	Mixed Waste
216-A-6	Crib	Inactive	N39880 W47000 (center)	Mixed Waste
2607-EL	Septic Tank	Active	N40000 W47300	Nonhazardous/Nonradioactive
UPR-200-E-21	Unplanned Release	Inactive	N39880 W47000	Mixed Waste
UPR-200-E-29	Unplanned Release	Inactive	N39880 W47000	Mixed Waste
UPR-200-E-66	Unplanned Release	Inactive	N40050 W46450	Mixed Waste

Table 6-2. Operational Data and Waste Volumes for Operable Unit 200-PO-4.

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
216-A-30	Liquid	January 1961	Active		Bot	1400	10	12	3300	7110000000	0.00	
216-A-37-1	Liquid	March 1977	Active		Bot	700	10	11	1800	377000000	0.00	
216-A-37-2	Liquid	1983	Active		Bot	1400	10	15	0	1090000000	0.00	
216-A-42	Liquid	September 1978	Active		Bot	342	30	23	0	0	0.00	UPR-200-E-66
216-A-6	Liquid	November 1955	January 1970		Bot	100	100	19	2800	3400000000	47.82	UPR-200-E-21 and -29
2607-EL	Liquid	1983	Active		Top	0	0	0	0	0	0.00	
UPR-200-E-21	Liquid			March 20, 1959	Top	0	0	0	0	0	0.00	
UPR-200-E-29	Liquid			January 20, 1961	Top	0	0	0	0	0	0.00	
UPR-200-E-66	Liquid			November 7, 1984	Top	0	0	0	0	0	0.00	

Table 6-3. Summary of Current Site Conditions for Operable Unit 200-PO-4.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-A-30	Light Chain	Underground Contamination	Concrete + Metal Posts	Soil cover/Backfill	2.0	Non-native Grass	None	0	133344
216-A-37-1	Light Chain	Underground Contamination	Metal Post with Plaque	Soil cover/Backfill	0.0	Non-native Grass	None	100	35691
216-A-37-2	Light Chain	Underground Contamination	Metal Post with Plaque	Soil cover/Backfill	3.0	Native Grass	None	100	73640
216-A-42	Remesh Fence	Surface Contamination	Radioactive Material	Gravel/Soil Cover	0.0	Brush/Grass	Abuts Adjac. Site	0	0
216-A-6	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Brush/Grass	Abuts Adjac. Site	64316	64316
2607-EL	None	None	None	None/Unknown	0.0	None	None	0	0
UPR-200-E-21	Remesh Fence	Underground Contamination	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	0
UPR-200-E-29	Remesh Fence	Underground Contamination	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	0
UPR-200-E-66	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0

Table 6-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-PO-4.

Site	Fluoride (kg)	H2SO4 (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	NaCr2 (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-A-30	0	0	0	0	0	0	0	0	0	0	16000	0	0
216-A-37-1	0	0	0	0	0	0	0	0	0	0	600	0	0
216-A-6	0	0	0	0	0	0	0	0	0	0	10000	0	0

6.2 216-A-30 CRIB

This active unit is located outside the 200 East Area perimeter fence, about 1,600 ft east of the 202-A building (Cramer 1987). A total of 7,110,000,000 L of waste containing americium-241, cesium-137, tritium, promethium-147, plutonium-239, ruthenium-106, tin-113, and strontium-90 has thus far been discharged to the crib. Until November 1965, the site received the steam condensate, equipment disposal tunnel floor and water-filled door drainage, and the slug storage basin overflow waste from the 202-A building. The site was inactive from November 1965 to January 1970, because the effluent flow rate had exceeded the infiltration capacity. The effluent was then routed to the restored 216-A-6 crib. This crib was restored in January 1970 and was again receiving the above effluents because the 216-A-6 crib had been retired (Lundgren 1970).

During the winter of 1971 and 1972, an alkaline deposit formed over the surface of the site. It appeared to be a salt deposit condensing out of vapors being emitted from the unit through the porous soil. In June 1972, the ground was covered with layers of sand and plastic (Maxfield 1979). A 1990 radiation survey found spots of contamination with 2,000 to 5,000 dis/min readings (BHI 1994). A surface radiological survey conducted in 1990 did not find evidence of radioactivity above detection limits (BHI 1994).

At the present time the crib has an irregular surface, varying between 2 ft above to slightly below grade in height. The northwest corner of the site is below grade and mud cracks were readily apparent during a site visit by the authors, suggesting that some ponding of surface water occurs (site visit by authors, 1991).

6.3 216-A-37-1 CRIB

This active unit is located outside the 200 East Area perimeter fence, about 2,000 ft east of the 202-A building (Cramer 1987). The site has received 377,000,000 L of process condensate thought to contain americium-241, cesium-137, tritium, iodine-129, promethium-147, plutonium-239, ruthenium-106, tin-113, and strontium-90 from the 242-A evaporator to date (Cramer 1987; Brown et al. 1990). A valve station is at the south end of the crib and a vent is located at the north end. The valve station is inside the crib perimeter fence and has surface radiation warning signs and a light chain barricade (site visit by authors, 1991).

Wells 299-E25-19 and 299-E25-20 monitor this site and indicate an increasing and decreasing tritium activity, respectively. The NO_3 concentration remains at two to five times the drinking water standards. A surface radiation survey, performed in 1991, did not detect contamination (BHI 1994).

6.4 216-A-37-2 CRIB

This active waste unit is also located outside the 200 East Area perimeter fence, east of the 216-A-1 crib and directly north of the 216-A-30 crib (Cramer 1987). It is immediately southeast of 216-A-37-A (Hanford drawing H-2-44500, Sheet 1). The site received 1,090,000,000 L of steam condensate thought to contain americium-241, cesium-137, tritium, promethium-147, plutonium-239, ruthenium-106, tin-113, and strontium-90 from the 202-A building (Cramer 1987; Brown et al. 1990). The central portion of the crib's surface has subsided. A valve station and access port are located at the north end of the crib, but are not shown on Hanford drawing H-2-44501, Sheet 34 (site visit by authors, 1991).

This unit has a parallel operation with the 216-A-30 crib. The radionuclide inventory has been included in the inventory for the 216-A-30 crib since the fourth quarter of 1983 (BHI 1994). The 1991 radiological survey found contamination at levels of 500 dis/min (alpha) and 200 dis/min (beta) (environmental protection hardfiles). BHI (1994) indicates that the 1990 radiation survey results were below detection limits.

6.5 216-A-42 RETENTION BASIN/UPR-200-E-66

This active basin is located east of the 202-A building, and directly east of the 216-A-6 crib (Maxfield 1979). The unit receives chemically or radioactively contaminated diversions from the PUREX sewer line, cooling water line, and steam condensate discharge. Depending on the treatment required for the waste, it can be released from the unit to the 216-A-30 and 216-A-37-2 cribs, to PUREX process piping, or to the tank farms (Cramer 1987). The unit has a built in recovery system to provide the capability of pumping back waste into the PUREX facility for reprocessing (Maxfield 1979).

The basin has one UPR (UPR-200-E-66). On November 7, 1984, contamination from the basin was spread by the wind and consisted of unknown beta/gamma with readings inside the area to 40,000 c/m and outside to 3,000 c/m. The ground was wet down and the basin was flushed (Cramer 1987). A 1988 surface radiological survey found spots of contamination on the south edge with readings up to 200,000 dis/min (environmental protection hardfiles).

At the present time there are no posted warning signs outside the basin (site visit by authors, 1991). The basin is covered with large concrete lids with access ports that were open during the authors site visit. The pump station on the southwest side is shielded with a gravel berm and both the pump station and the retention basin are enclosed with a tall box-wire fence. Two portable pumps were in place on the retention basin lid and had hoses inserted into the basin (site visit by authors, 1991).

6.6 2607-EL SEPTIC TANK

BHI (1994) reports this tank is still active and includes a drain field. The site accepts sanitary wastewater and sewage at the rate of 7.9 m^3/d (Cramer 1987). Both BHI (1994) and Bovay (1991) suggest that this tank is located east of the 272-AW building. However, the 241-AP tank farm is at that location and no septic tank could be found at those coordinates. The septic tank may have been removed when the 241-AP tank farm was constructed (Badden, Personal Communication 1991).

7.0 OPERABLE UNIT 200-PO-5

Most of this operable unit is located outside the 200 East Area perimeter fence, sandwiched between Operable Unit 200-BP-11 to the north and the Grout Treatment Facility on the south (Figures 1-1 and 7-1). Sites within the unit have been active from the mid-1950's to the present.

There are 19 sites in this operable unit and four of these sites are still active. Four cribs, four french drains, one active retention basin, three trenches, two ditches, two UPRs, a control structure, catch tank, and a septic tank are included within this unit. Table 7-1 provides site locations and waste types for Operable Unit 200-PO-5.

Retention basin 207-A-RB contains hazardous waste and crib 216-A-8 contains low-level waste. All other sites, except the 2607-EC septic tank, contain mixed waste. Although crib 216-A-8 has received more waste than any other site within this operable unit, it is still active and has not been evaluated with respect to posing a migration hazard. Of the remaining sites only two, cribs 216-A-7 and 216-A-24, constitute a significant migration hazard, since both scored 57.89 (Table 7-2; Stenner et al. 1988).

A graphical summary of the operational history of the individual sites is presented in Figure 7-2. The starting and ending dates for each site are listed in Table 7-2. Table 7-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November 1991. A list of the organic and inorganic contaminants that were part of the waste disposed in the area is given in Table 7-4. This data was extracted from BHI (1994) and should be used as a guideline only.

7.1 207-A RETENTION BASIN

This active basin is located directly east of the 242-A evaporator. The unit has been intermittently receiving two liquid waste steams from the 242-A evaporator, when the evaporator is in use. The first stream is sent to the three north basins and then goes to the 216-A-25 pond. The second stream is process condensate that is sent to the three south basins and then goes to the 216-A-37-1 crib (Maxfield 1979).

In operation, the basins are alternatively filled, sampled, and emptied when meeting specifications. The north basins are discharged into the Gable Mountain pond pipeline, and the south basins are discharged to the 216-A-37 crib. The facility includes the capability of returning liquid waste for reprocessing or in-tank storage if discharge specifications are not met (Maxfield 1979).

Sediment in the south basins was emitting 1,500 c/m during a 1990 survey. Currently, the north basins are lined with a membrane and the southern basins are painted (site visit by authors, 1991). Hanford photograph 122440-18-CN depicts both sets of basins after they had been freshly painted.

Figure 7-1. Location Map for Operable Unit 200-PO-5.

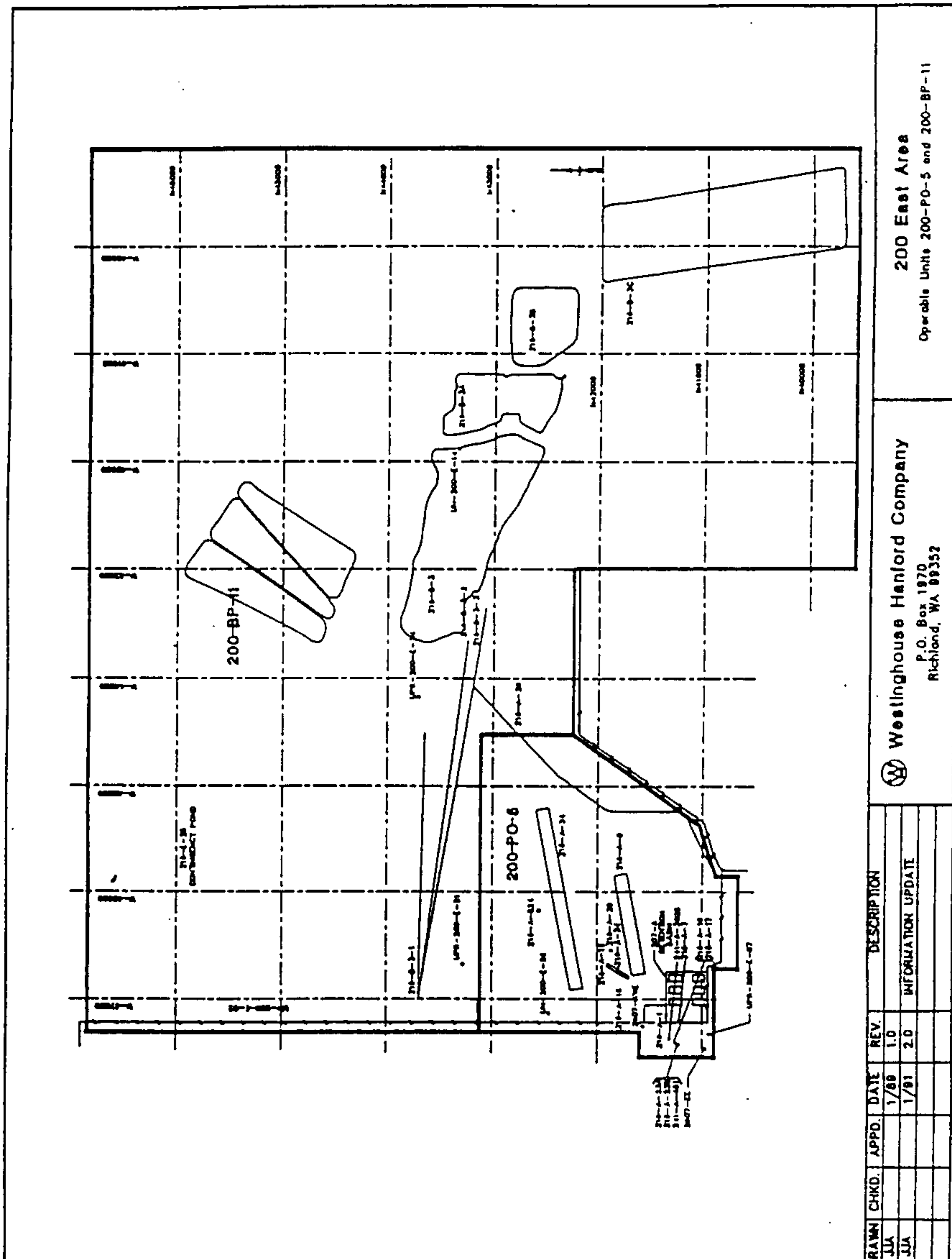


Table 7-1. Site Location and Waste Type for Operable Unit 200-PO-5.

Site	Type of Site	Status	Coordinates	Type of Waste
207-A RB	Retention Basin	Active	N41220 W46890, N41220 W47105, N40900 W47105, N40900 W46890	Hazardous Waste
216-A-1	Crib	Inactive	N41330 W47150 (center)	Mixed Waste
216-A-16	French Drain	Inactive	N41191 W47443 (center)	Mixed Waste
216-A-17	French Drain	Inactive	N41181 W47453 (center)	Mixed Waste
216-A-18	Trench	Inactive	N41860 W47000 (center)	Mixed Waste
216-A-19	Trench	Inactive	N41900 W46680 (center)	Mixed Waste
216-A-20	Trench	Inactive	N41875 W46540 (center)	Mixed Waste
216-A-23A	French Drain	Inactive	N41171 W47462 (center)	Mixed Waste
216-A-23B	French Drain	Inactive	N41171 W47472 (center)	Mixed Waste
216-A-24	Crib	Inactive	N42256 W46920, N42512 W45278 (centerline)	Mixed Waste
216-A-29	Ditch	Active	N40685 W46350, N43050 W44750 (centerline)	Mixed Waste
216-A-34	Ditch	Inactive	N41710 W46800 (head) N41900 W46680 (end)	Mixed Waste
216-A-524	Control Structure	Inactive	N42560 W46180	Mixed Waste
216-A-7	Crib	Inactive	N41205 W47200 (center)	Mixed Waste
216-A-8	Crib	Active	N41640 W46734, N41779 W45870 (centerline)	Low-Level Waste
241-A-302B	Catch Tank	Inactive	N41280 W47355	Mixed Waste
2607-EC	Septic Tank	Active	N40900 W47500	Nonhazardous/Nonradioactive
UN-200-E-56	Unplanned Release	Inactive	N42450 W47150	Mixed Waste
UN-200-E-67	Unplanned Release	Inactive	N40900 W47375	Mixed Waste

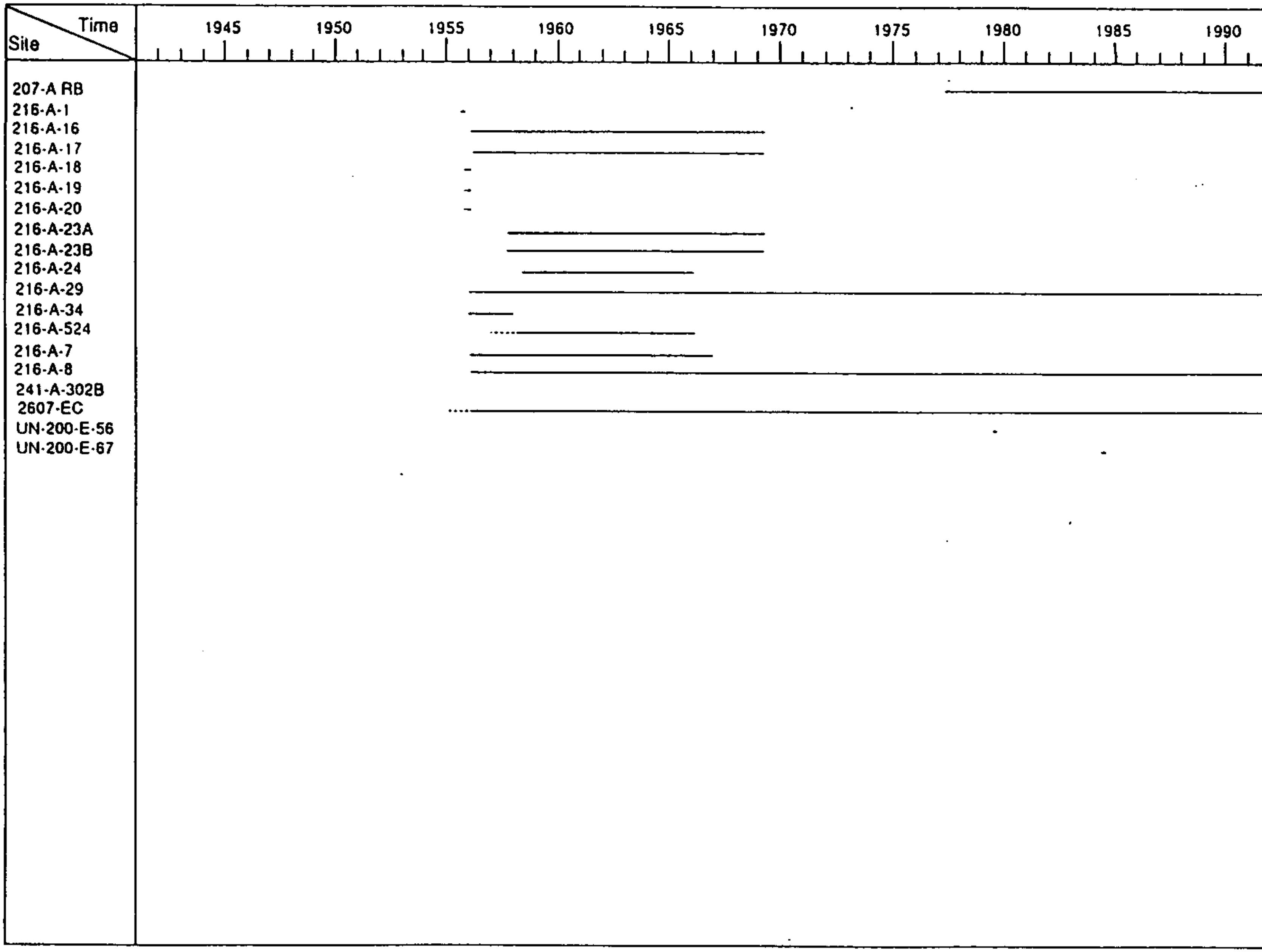


Figure 7-2. Summary of Operational Periods for Operable Unit 200-PO-5.

Table 7-2. Operational Data and Waste Volumes for Operable Unit 200-PO-5.

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
207-A RB	Liquid	March 1977	Active		Top	0	0	0	0	0	0.00	
216-A-1	Liquid	November 1955	December 1955		Bot	30	30	15	360	98400	1.04	
216-A-16	Liquid	January 1956	March 1969		Top	0	0	17	0	122000	1.04	
216-A-17	Liquid	January 1956	March 1969		Top	0	0	17	0	60000	1.04	
216-A-18	Liquid	November 1955	January 1956		Bot	80	80	15	16000	488000	1.04	
216-A-19	Liquid	November 1955	January 1956		Bot	25	25	15	66	1100000	2.18	
216-A-20	Liquid	November 1955	January 1956		Bot	25	25	15	66	961000	2.07	
216-A-23A	Liquid	September 1957	March 1969		Top	0	0	13	0	6000	2.61	
216-A-23B	Liquid	September 1957	March 1969		Top	0	0	7	0	6000	1.04	
216-A-24	Liquid	May 1958	January 1966		Bot	1400	20	15	4800	820000000	57.89	
216-A-29	Liquid	November 1955	Active		Bot	4000	6	0	9600	0	0.00	
216-A-34	Liquid	November 1955	December 1957		Top	280	0	3	0	0	1.09	
216-A-524	Liquid	1957	January 1966		Top	16	8	11	0	0	0.00	
216-A-7	Liquid	November 1955	November 1966		Bot	10	10	15	140	326000	57.89	
216-A-8	Liquid	November 1955	Active		Bot	850	20	14	6600	1150000000	0.00	
241-A-302B	Liquid	1956 (?)	1985 (isolated)		Top	0	0	0	0	0	0.00	
2607-EC	Liquid	1955	Active		Top	0	0	0	0	0	0.00	
UN-200-E-56	Solid			June 13, 1979	Top	100	100	10	0	0	0.00	
UN-200-E-67	Solid			May 7, 1984	Top	0	0	0	0	0	0.00	

Table 7-3. Summary of Current Site Conditions for Operable Unit 200-PO-5.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
207-A RB	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	None	223300	223300
216-A-1	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	None/Unknown	0.0	Brush/Grass	Abuts Adjac. Site	14000	14000
216-A-16	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-A-17	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-A-18	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.0	Brush/Grass	None	0	17956
216-A-19	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	3.0	Brush/Grass	None	0	6270
216-A-20	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	3.0	Brush/Grass	None	0	6270
216-A-23A	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-A-23B	Chain Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Tank Farm	0	0
216-A-24	Light Chain	Underground Contamination	None	Soil cover/Backfill	2.0	Non-native Grass	None	0	161995
216-A-29	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	-4.0	None	None	39000	39000
216-A-34	Light Chain	Underground Contamination	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	6816
216-A-524	None	None	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	0
216-A-7	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	None/Unknown	0.0	None	Abuts Adjac. Site	6000	6000
216-A-8	Light Chain	Underground Contamination	Concrete + Metal Posts	Soil cover/Backfill	2.5	Brush/Grass	None	3227	83227
241-A-302B	Light Chain	Surface Contamination	Metal Post with Plaque	Gravel	0.0	None	Abuts Adjac. Site	0	0
2607-EC	Chain Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Tank Farm	0	0
UN-200-E-56	Light Chain	Underground Contamination	None	Soil cover/Backfill	0.0	Native Grass	None	0	0
UN-200-E-67	None	None	None	None/Unknown	0.0	None	None	0	0

Table 7-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-PO-5.

Site	Fluoride (kg)	NPH (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	NaCr2 (kg)	Na OH (kg)	Na Oxalate (kg)	NaSI (kg)	NH4CO3 (kg)	Nitrite (kg)	Nitrate (kg)	TBP (kg)	Butyl Phosph (kg)
216-A-1	0	0	0	0	0	0	0	0	0	0	0	80	0	0
216-A-16	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-17	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-18	0	0	0	0	0	0	0	0	0	0	0	730	0	0
216-A-19	0	0	0	0	0	0	0	0	0	0	0	20000	0	0
216-A-20	0	0	0	0	0	0	0	0	0	0	0	210	0	0
216-A-23A	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-23B	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-A-24	0	30000	0	0	0	0	0	0	0	200000	0	0	0	90000
216-A-7	0	180000	0	0	0	0	0	0	0	0	0	0	100000	0
216-A-8	0	46000	0	0	0	0	0	0	0	320000	0	0	0	130000

7.2 216-A-1 CRIB

The 216-A-1 crib is located inside the 200 East Area perimeter fence extension, 200 ft east of the 241-A tank farm, along Canton Avenue (Maxfield 1979). It received approximately 98,400 L of the depleted uranium waste containing cesium-137, ruthenium-106, and strontium-90 from the PUREX cold start-up run (Stenner et al. 1988). This site, along with the 216-A-7 crib, is surrounded by a light chain barricade with surface contamination warning signs (site visit by authors, 1991).

The site was deactivated by removing the aboveground piping and backfilling when it reached the specific retention capacity (Maxfield 1979). In 1984, a few spots were found that read 90,000 c/m. In 1990, 3,000 dis/min (beta) spots were found, but in 1991 a surface radiological survey showed the area to be below detection limits (environmental protection hardfiles).

7.3 216-A-7 CRIB

The 216-A-7 crib was established about 100 ft east of the 241-A tank farm, across Canton Avenue (Maxfield 1979). Until July 1959, the unit received the catch tank overflow waste, the sump waste, and the pump pit drainage from the 241-A-152 diversion box. From July 1959 to November 1966, the site received the catch tank overflow waste and the pump pit drainage from the 241-A-152 diversion box. In November 1966, the site received the TBP-soltrol organic inventory from the 202-A building. A total of 326,000 L of low-salt waste thought to contain cesium-137, ruthenium-106, and strontium-90 was discharged to the crib (Stenner et al. 1988). The site was deactivated by blanking off the effluent pipeline from the 241-A-152 diversion box (Maxfield 1979).

In 1990 and 1991 spots of contamination with readings up to 30,000 dis/min (beta) were found. The surface radiation is generally at background levels, but radioactive pieces of tumbleweed are found occasionally (environmental protection hardfiles).

7.4 216-A-8 CRIB

This active waste site is east of the perimeter fence and 650 ft northeast of the 241-A tank farm (Cramer 1987). Until December 1957, the site received condensate from the waste storage tanks in the 241-A and 241-AX tank farms. From December 1957 to May 1958, the site received the above effluents and cooling water from the contact condenser in the 241-A-431 building. From May 1958 to January 1966, the site was inactive as it had approached the radionuclide capacity and was valved out. The condensate was then routed to the 216-A-24 crib and the cooling water routed to the 216-A-25 pond. From January 1966 to April 1976, the site was reactivated to receive the condensate from the 241-A and 241-AX tank farms. From May 1976 to January 1978, the site was again inactive. From January 1978 to April 1978, the site received 241-A, 241-AX, and 241-AY tank farm condensate. From May 1978 to October 1983, the site was again inactive. In October 1983, the unit was reactivated to receive 241-AY and 241-AZ tank farm condensate. From October 1983 to March 1984, the site was inactive (Kady and Gelman 1984). The radionuclides thought to be present at this waste site are cesium-137, tritium, ruthenium-106, and strontium-90 (Brown et al. 1990).

Wells E25-4, E25-5, E25-6, E25-7, E25-8, E25-9, E25-14 monitor this unit. No measurable migration of radionuclides disposed to the ground from this unit has been detected from the scintillation probe profiles. These data indicate that breakthrough to groundwater has not occurred at this site (Fecht et al. 1977). In 1988, weeds with 500 to 20,000 c/m and soil with 400 to 70,000 c/m were found onsite. Contamination on risers was detected in 1990, but in 1991 the risers were below detection limit (environmental protection hardfiles). The site surface was stabilized in September 1990 (Huckfeldt 1990).

7.5 216-A-16 FRENCH DRAIN

This drain is located within the southeast corner of the 241-A tank farm (Maxfield 1979). Both this drain and the 216-A-17 drain are east of the 431-A ventilation building. The unit received a total of 122,000 L of floor drainage and the 296-A-11 stack drainage from the 241-A-431 building. The waste is expected to contain less than 10 Ci total beta activity (Stenner et al. 1988). The unit receives the overflow from 216-A-17 french drain (BHI 1994). The piping was water sealed when the 296-A-11 stack exhaust system was deactivated (Lundgren 1970). Currently, there is no piping or other surface feature to indicate the location of this drain (site visit by authors, 1991).

7.6 216-A-17 FRENCH DRAIN

This unit is located within the southeast corner of the 241-A tank farm (Maxfield 1979). It is constructed approximately 11 ft below grade (BHI 1994) and no surface manifestations of the drain were observed in the field (site visit by authors, 1991).

Floor drainage and the 296-A-11 stack drainage from the 241-A-431 building was discharged to this drain. The 60,000 L of waste is expected to have less than 1 Ci total beta activity (Stenner et al. 1988). This unit overflows to the 216-A-16 french drain (BHI 1994).

7.7 216-A-18 TRENCH

This trench is located outside of the 200 East Area perimeter fence, 500 ft east of the 241-AX tank farm, along Canton Avenue (Maxfield 1979; Harmon et al. 1975). Approximately 488,000 L of depleted uranium waste containing cesium-137, ruthenium-106, and strontium-90 from the cold start-up run at the 202-A building was discharged to this site (Stenner et al. 1988).

The site was deactivated by removing the aboveground piping and backfilling the excavation after the specific retention capacity was reached (Lundgren 1970). The site was surface stabilized in September 1990 (Huckfeldt 1990). In 1982, some spots of contamination with up to 60,000 c/m were found. From 1987 to the present, the surveys have all been below detection limits (environmental protection hardfiles).

7.8 216-A-19 AND 216-A-20 TRENCHES

These waste sites are located outside the perimeter fence, 750 to 800 ft east of the 241-AX tank farm and 500 ft east of Canton Avenue (Maxfield 1979). Both trenches are enclosed by the same light chain barricade (site visit by authors, 1991). The 216-A-19 trench received 1,100,000 L and the 216-A-20 trench received 961,000 L of the 241-A-431 building contact condenser cooling water via the 216-A-34 ditch and the depleted uranium waste from the cold start-up run in the 202-A building

(Stenner et al. 1988). The waste is expected to contain cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

When the specific retention capacities of the units were reached, they were deactivated by removal of surface piping and backfilling the excavations (Lundgren 1970). Both sites were surface stabilized in September 1990 (Huckfeldt 1990). Other than a few specks of contamination with up to 5,000 c/m, this site has been below detection limits (environmental protection hardfiles).

7.9 216-A-23A AND 216-A-23B FRENCH DRAINS

These french drains are located in the southeast corner of the 241-A tank farm, south of the 431-A ventilation building. Both are constructed below grade, only a single yellow gooseneck pipe was observed to mark their location in the field (BHI 1994; site visit by authors, 1991). Six-thousand liters of de-entrained tank condensate and the back flush waste from the 241-A-431 building was discharged to each unit. The waste is low salt and is expected to contain less than 50 Ci total beta activity (Stenner et al. 1988). The sites were deactivated by water-sealing the pipes leading to them (Lundgren 1970).

7.10 216-A-24 CRIB

The 216-A-24 crib is located outside the perimeter fence, about 750 ft northwest of the 241-AX tank farm along Canton Avenue (Harmon et al. 1975). The site received 820,000,000 L of the condensate from the waste storage tanks in the 241-A and 241-AX tank farms. The waste is believed to be low salt and contain cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

The valve to the crib was believed to have been closed in January 1966. However, it was still open in 1979 (Occurrence Report 79-113). The valve has since been closed. Because of this inadvertent use, the radionuclide inventory is unknown for 1967 to 1979 (BHI 1994). This site was deactivated and the waste was routed to the 216-A-8 crib (Lundgren 1970). In September 1990, the surface of the site was stabilized (Huckfeldt 1990). At the present time it is currently about 2 ft above grade and there are numerous concrete marking posts lying around the site (site visit by authors, 1991). The crib adjoins the area of UPR UN-200-E-56.

Wells E26-2, E26-3, E26-4, E26-5, and E26-7 monitor this unit. Data indicate that breakthrough to groundwater could have occurred from the first and second section of the unit (Fecht et al. 1977). Prior to 1988, radiation surveys identified brush with up to 30,000 c/m (beta). Since then, the crib area has generally been below detectable limits (environmental protection hardfiles).

7.11 216-A-29 DITCH

This active waste site is located outside the perimeter fence, 525 ft southeast of the southeast corner of the 241-A tank farm. This unit empties into the 216-B-3-3 ditch, which terminates at the 216-B-3 pond (Maxfield 1979). The unit has received wastes from the 202-A building chemical sewer, acid fractionator condensate and condenser cooling water that flows to the 216-B-3 pond (Maxfield 1979). Until December 1957, the site received process cooling water and chemical sewer waste from the 202-A building. From December 1957 to February 1958, the site received the above waste minus the process cooling water, which was rerouted to the 216-A-25 pond. From February 1958 to December 1962, the site received the above waste plus acid fractionator condensate from the 202-A building. From December 1962 to December 1963, the site received the above waste plus seal cooling water from air sampler vacuum pumps in the 202-A building. From December 1963 to January 1966, the site received the above waste minus vacuum pump cooling water, which was rerouted to the 216-A-35 french drain (BHI 1994).

The site has had many known releases of chemicals, which included:

Date	Amount (lbs)	Chemical
10-02-84	280	Hydrazine
	407	Hydroxylamine nitrate
12-02-84	62,683	Potassium hydroxide
01-18-85	6,236	Nitric acid
02-08-85	160	Sodium nitrate
05-27-85	233	Nitric acid
06-25-85	24,189	Nitric acid
	5,368	Ammonium fluoride
	1,016	Ammonium nitrate
08-06-85	42,440	Sodium hydroxide
10-28-85	1,181	Nitric acid
12-18-85	35	Cadmium nitrate
07-07-86	6	Hydrazine

The radionuclide inventory for this ditch is included with the 216-B-3 system (Maxfield 1979). Water samples are taken weekly and sediment and vegetation samples are taken annually (BHI 1994). In 1989, a 2,000 c/m (beta) spot of contamination was identified. Otherwise, the ditch is below detection level (environmental protection hardfiles).

The site has recently undergone dramatic change. South of the Grout Treatment Facility perimeter fence, the ditch has been filled to grade with gravel and surrounded with a light chain barricade posted with underground contamination placards. From the perimeter fence north to 216-B-3-3, the ditch has been cleared of vegetation and graded to a gentle side slope. Several gravel covered ridges cross the ditch. Unlabeled concrete markers were in place and were being surveyed during the November 1991 site visits (site visit by authors, 1991).

7.12 216-A-34 DITCH

The ditch is located about 300 ft east of Canton Avenue and about 900 ft northeast of the 241-A tank farm (Maxfield 1979) on the north end of the 216-A-8 crib (BHI 1994). The unit received cooling water from the contact condenser, located in the 241-A-431 building, enroute to the 216-A-19 and 216-A-20 trenches. The site contains less than 1 Ci total beta activity (Stenner et al. 1988).

The site was deactivated by blanking the effluent pipeline to the unit and then backfilling. The waste has been rerouted to the 216-A-8 crib (Lundgren 1970). The site surface was stabilized in September 1990 (Huckfeldt 1990). Prior to 1991, some spots with readings to 10,000 dis/min (beta) were identified. Since 1991, surveys have been below detection limits (environmental protection hardfiles). At the present time the ditch is backfilled and posted with underground contamination warning signs (site visit by authors, 1991).

7.13 216-A-524 CONTROL STRUCTURE

This structure is within the 216-A-24 crib area (Crusselle and Romano 1982). BHI (1994) coordinates place this structure north of the 216-A-24 crib, in a vacant area distant from any pipelines (site visit by authors, 1991). Environmental protection records contain a work order mandating the disassembly of the 216-A-524 control structure, located at the southwest side of the crib. Currently, there is no surface manifestation of this control structure (site visit by authors, 1991), suggesting that the aboveground components have been removed (contrast with photo of site 216-A-24).

The unit contains radioactively contaminated piping and cement. The amounts of the radionuclides present is not known. There is 500 c/m smearable contamination, 10,000 c/m direct beta/gamma, 40 mrem/h nonpenetrating, and 0.7 mrem/h penetrating radiation (Cramer 1987).

Prioritization of this facility for decommissioning clarifies the relative radiological hazard as medium in comparison with other 200 Area surplus facilities (Cramer 1987).

7.14 241-A-302B CATCH TANK

This tank is located in the 241-A tank farm, which is about 13,000 ft northeast of the 202-A building (BHI 1994). It is located on the berm on the east side of the tank farm fence. A light chain barricade with surface contamination placards extends from the fence to the tank. A fill pipe and a liquid level measurement station are present. A buffer zone has been made in the barrier surrounding the tank, probably to allow liquid level measurements to be taken. Another surface contamination barrier has been set up parallel to, and about 3 ft distant from, the east fence. The barrier extends from the southeast corner, around the northeast corner, and terminates approximately 6 ft north of the northeast corner (site visit by authors, 1991).

The unit was used for transfer of waste solution from processing and decontamination operations. Volumes are variable depending on specific plant operation. It currently contains 3,240 gal of waste (BHI 1994). This unit was isolated in 1985 and interim stabilized in 1990 (Hanlon 1990).

7.15 2607-EC SEPTIC TANK

Septic tank 2607-EC is located inside the 241-A tank farm. Coordinates listed in BHI (1994) suggest that the site is located in the northeast corner of the tank farm and Hanford drawing H-2-44501, Sheet 69, shows a septic tank at that location. However, due to the surface contamination zone surrounding the facility and various other obstructions the exact location of the septic tank could not be determined by the authors during their site visit (site visit by authors, 1991). The active tank and drain field receive sanitary wastewater and sewage at the estimated rate of 0.45 m^3/d (Cramer 1987).

An additional septic tank was identified during the preparation of this report. Septic tank 2607-E10 is located at the Grout Treatment Facility. This is not a replacement for the 2607-EC tank.
The 2607-E10 tank is not listed in BHI (1994).

7.16 UN-200-E-56 UNPLANNED RELEASE

On June 13, 1979, contaminated soil was found during an excavation for clean soil to be used around the 241-AN tanks. The contamination consisted of unknown beta/gamma with readings up to 8,000 c/m (Stenner et al. 1988). The area was posted and zoned off (Stenner et al. 1988). Since 1990, radiation surveys have been below detection limits (health physics hardfiles).

The equipment used for the excavation was decontaminated and the area where this decontamination took place was designated UN-200-E-94 (see Chapter 5.0, Operable Unit 200-PO-3). Soil excavated from UN-200-E-91, and also apparently from UN-200-E-100, was placed in this excavation (BHI 1994). Currently, an underground radiation zone adjoins site 216-A-24 on its northern side (site visit by authors, 1991).

7.17 UN-200-E-67 UNPLANNED RELEASE

During an excavation of a site north of the parking lot at 272-AW an old contaminated pipe encasement was encountered. The contamination consists of unknown beta/gamma with readings from 1,000 to 1,500 mR/h (Cramer 1987). No potential for release exists from this spill site because the area was decontaminated to existing background levels of radiation (Cramer 1987). The site does not have any warning signs and is not barricaded (site visit by authors, 1991).

8.0 OPERABLE UNIT 200-PO-6

Operable Unit 200-PO-6 occupies the northeast corner of the 200 East Area (Figures 1-1 and 8-1). A graphical summary of the operational history of the individual sites is presented in Figure 8-2. Table 8-1 provides site locations and waste types for Operable Unit 200-PO-6. The starting and ending dates for each site are listed in Table 8-2.

An inactive burning pit, four UPRs, two inactive burial grounds, and an active burial ground, 218-E-12B, form this operable unit (Table 8-1). Except for the burning pit, all sites contain mixed waste. None of the sites ranked higher than 1.5 on the migration hazard ranking scale (Table 8-2; Stenner et al. 1988).

Table 8-3 provides a summary of current site conditions based on several site visits performed by the authors during October and November 1991. None of the sites are reported to contain any organic or inorganic contaminants (BHI 1994).

8.1 200-E BURNING PIT/UPR-200-E-62 AND UPR-200-E-106

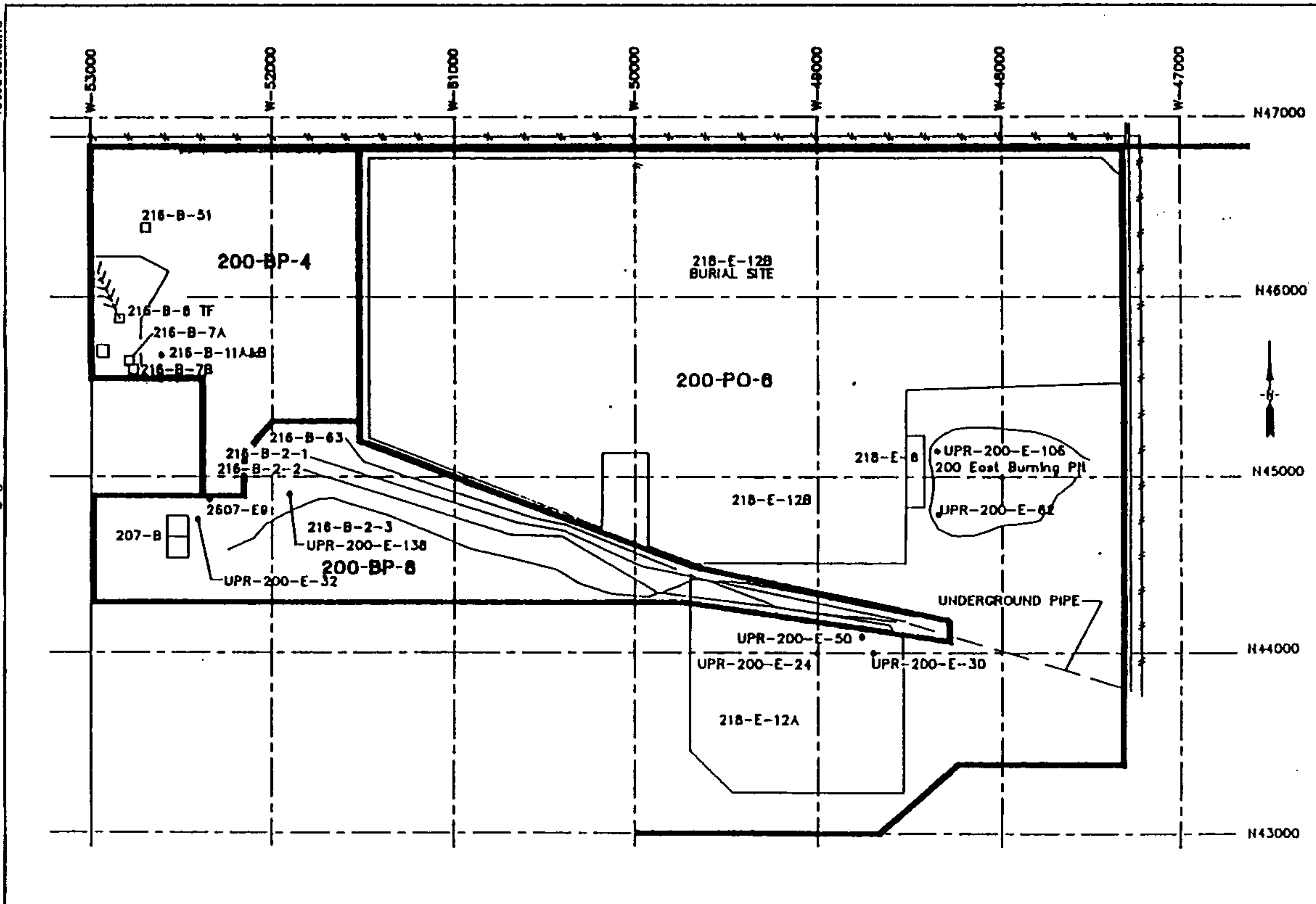
The burning pit is located in the large excavation east of site 218-E-8. This site received 1,500 m^3 of construction and office waste, paint wastes, and chemical solvents. The site was not intended to burn radioactive waste (Stenner et al. 1988). There are no specific markers for the site (site visit by authors, 1991).

Three enclosures are located within the basin. South of site 218-E-8, a 40-ft by 40-ft light chain and nylon rope barrier with surface contamination placards surrounds several drums, pallets, and sections of steel pipes. This may be a tank farm storage area. A nylon cord extends from the 218-E-8 eastern perimeter out about 20 ft to a fallen steel T-post. The triangular enclosure is empty. In the middle of the basin is a 15-ft by 15-ft light chain barricade with asbestos warning signs. Several small excavations are visible inside the enclosure (site visit by authors, 1991). Northeast of the asbestos enclosure is a 15-ft by 15-ft empty rope enclosure with a sign labeled "RCRA Waste Site." This enclosure marks the location of a single detonation event in 1984, used to dispose of a quantity of unstable liquids. The chemicals detonated included:

Butoxyethanol	19 L
Dioxane	.95 L
1,4 Dioxane	1.25 L
Hydrogen Peroxide	11.36 L
Isopropyl ether	8.0 L
Methyl Ethyl Ketone	0.18 L
Phosphoric Acid	189 L
Polyethylene Glycol Monoethyl Ether	0.95 L
Sodium Azide	0.47 L

(Miller, Personal Communication)

BHI00178.R00/V



DRAWN	CHKD.	APPD.	DATE	REV.	DESCRIPTION
JJA			1/89	1.0	
JJA			3/89	2.0	CHANGE SITE I.D.
JJA			1/91	3.0	INFORMATION UPDATE

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200 East Area
Operable Units
200-BP-4, 200-BP-8 and 200-PO-6 (Partial)

Figure 8-1. Location Map for Operable Unit 200-PO-6 (partial).

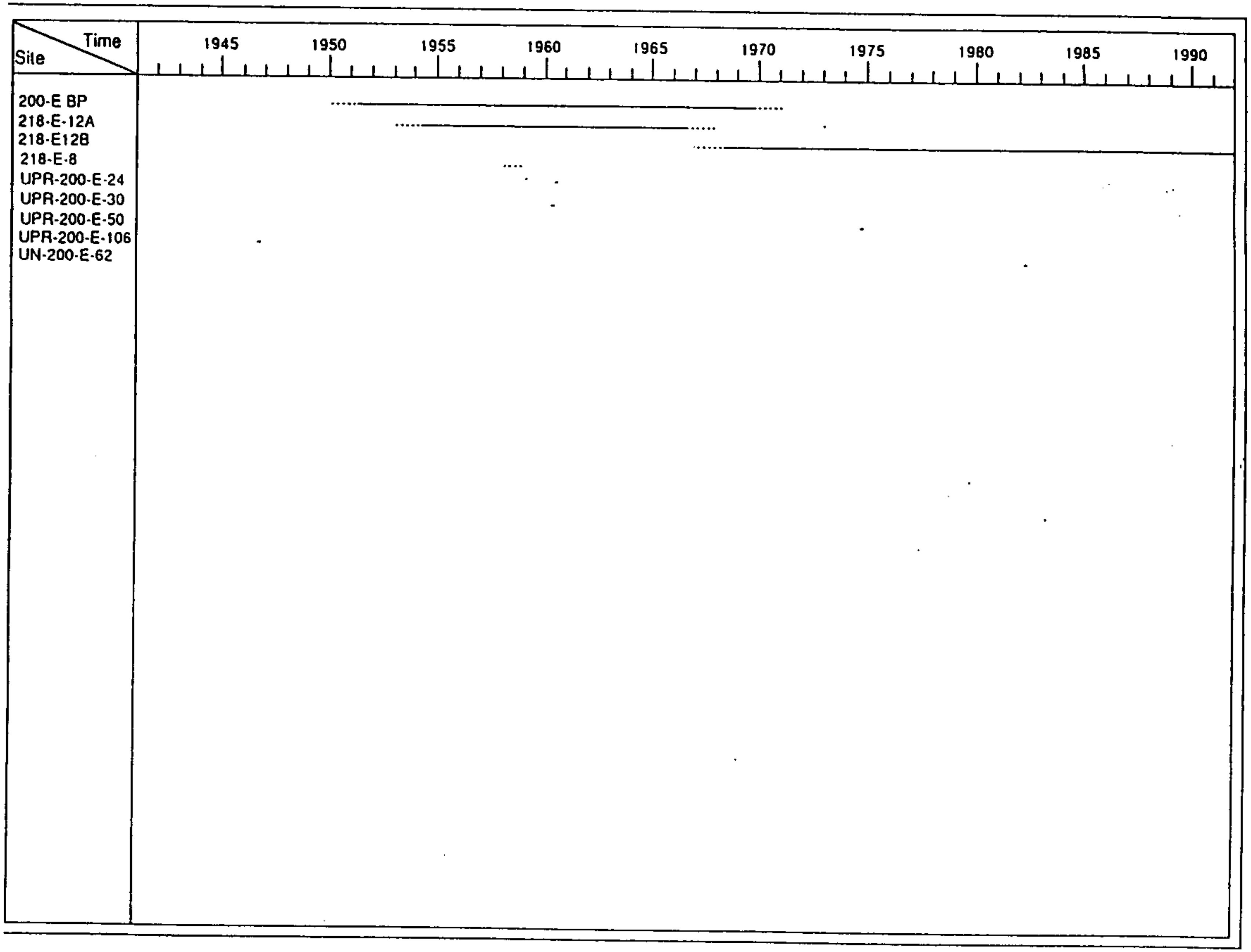


Figure 8-2. Summary of Operational Periods for Operable Unit 200-PO-6.

Table 8-1. Site Location and Waste Type for Operable Unit 200-PO-6.

Site	Type of Site	Status	Coordinates	Type of Waste
200-E BP	Burning Pit	Inactive	N45000 W48000	Hazardous Waste
218-E-12A	Burial Ground	Inactive	N44136 W48500, N43211 W48531, N43272 W49580, N43201 W49519,	Mixed Waste
218-E-12B	Burial Ground	Active	N46775 W51475, N46775 W47445, N46675 W47345, N45523 W47345,	Pre-1970 TRU/Mixed Waste
218-E-8	Burial Ground	Inactive	N45285 W48527, N45281 W48409, N44882 W48418, N44885 W48534	Mixed Waste
UN-200-E-62	Unplanned Release	Inactive	N44800 W48525	Mixed Waste
UPR-200-E-106	Unplanned Release	Inactive	N45150 W48375	Mixed Waste
UPR-200-E-24	Unplanned Release	Inactive	N44000 W49000, N44000 W55800	Mixed Waste
UPR-200-E-30	Unplanned Release	Inactive	N44000 W48700	Mixed Waste
UPR-200-E-50	Unplanned Release	Inactive	N44100 W48775	Mixed Waste

Table 8-2. Operational Data and Waste Volumes for Operable Unit 200-PO-6.

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
200-E BP	Solid	1950	1970		Top	394	201	15	0	0	0.00	UPR-200-E-106
218-E-12A	Solid	1953	1967		Top	1188	40	16	83114	15249	0.65	UPR-200-E-24, -30, & -50
218-E-12B	Solid	1967	Active		Top	0	0	0	121275	73398	0.00	
218-E-8	Solid	1958	1959		Top	400	115	15	18256	2265	0.65	
UN-200-E-62	Liquid			March 19, 1982	Top	0	0	0	0	0	0.00	
UPR-200-E-106	Solid			September 5, 1946	Top	0	0	0	0	0	0.00	
UPR-200-E-24	Solid			June 17, 1960	Top	0	0	0	0	0	0.82	
UPR-200-E-30	Solid			April 20, 1961	Top	0	0	0	0	0	0.91	
UPR-200-E-50	Solid			September 27, 1974	Top	450	75	0	0	0	1.14	

Table 8-3. Summary of Current Site Conditions for Operable Unit 200-PO-6.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
200-E BP	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
218-E-12A	None	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	Brush/Grass	None	0	1000000
218-E-12B	Light Chain	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	Brush/Grass	None	0	1215000
218-E-8	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.0	Brush/Grass	Abuts Adjac. Site	0	75000
UN-200-E-62	None	Underground Contamination	None	Soil cover/Backfill	0.0	Brush/Grass	Inside Burial Grd	0	0
UPR-200-E-106	None	None	None	Soil cover/Backfill	0.0	Brush/Grass	None	0	0
UPR-200-E-24	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.0	Brush/Grass	Inside Burial Grd	0	0
UPR-200-E-30	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.0	Native Grass	Inside Burial Grd	0	871
UPR-200-E-50	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.0	Native Grass	Inside Burial Grd	0	0

This site has two UPRs associated with it (UN-200-E-62 and UPR-200-E-106) (Stenner et al. 1988). UPR-200-E-106 consisted of contaminated paper towels from the control laboratory with radiation readings as high as 2.5 R/h found at the burning ground (Stenner et al. 1988).

8.2 218-E-8 BURIAL GROUND

This waste site is located about 5,000 ft north of the 202-A building on the hillside between the former burning pit and the 218-E-12B burial ground (Maxfield 1979). The site consists of an unknown number of backfilled trenches (Maxfield 1979).. This site adjoins the 218-E-12B site on the east. Its surface slopes down to the basin floor and the burning area. The east side is approximately 30 ft lower than the west, where it adjoins site 218-E-12B (site visit by authors, 1991).

The site received mixed fission products and transuranic waste, including repair and construction wastes from the 293-A and PUREX new crane addition (Stenner et al. 1988). The waste is expected to contain cesium-137, ruthenium-106, and strontium-90 (Anderson et al. 1991). On February 21, 1979, residue from broken tumbleweeds blown in along the west boundary line of this site was found to be reading greater than 100,000 c/m beta/gamma activity (Maxfield 1979).

8.3 218-E-12A BURIAL GROUND/UPR-200-E-24 AND UPR-200-E-30

This burial ground is located 150 ft northwest of the 241-C tank farm (Maxfield 1979). Several old wooden signs identifying trenches and the types of grasses sown to stabilize them are visible on the south side of the site. A small light chain barrier with underground contamination placards surrounding an area stabilized with sand was found on the south side of the burial ground. A ditch from B Plant cuts along the north perimeter that has surface contamination signs posted. The ditch empties into a pipe on the northeast corner of the burial ground (site visit by authors, 1991).

The site contains 28 dry waste burial trenches. Operational experience indicates that the trenches were often 40 ft wide rather than 30 ft wide, as shown in drawings. Also, the backfill was substantially less than the present requirement of 4 ft. Visual observations confirmed that some waste was visible at the surface prior to stabilization efforts (Stenner et al. 1988).

Trenches 1 through 3, 12 through 14, and 17 through 25 contain predominantly dry waste packaged in cardboard boxes and plastic bags. Trenches 4 through 11, 15 and 16, and 26 through 28 contain predominantly acid-soaked material. Specific contents of trench 28 are unlisted (Stenner et al. 1988).

During the past years, many of the trenches settled and created voids in the waste buried below. These holes were subsequently filled to ground level. The acid-soaked radioactive waste is buried in a shallow excavation. Earlier practices required the process operator to make the initial cover by hand shovel (Maxfield 1979).

This site has two UPRs associated with it (UPR-200-E-24 and UPR-200-E-30) (Stenner et al. 1988).

On June 17, 1960, a burial box collapsed during burial operations (UPR-200-E-24) causing spotty ground contamination from the burial ground to the east area perimeter fence, a distance of about 2 mi. The contamination had unknown beta/gamma with readings up to 2,000 mR/h at the site. Average radiation level inside the burial ground fence was 30 mR/h at 4 in. (Stenner et al. 1988).

On April 20, 1961, another burial box collapsed during burial operations (UPR-200-E-30) spreading contamination throughout the burial ground. The contamination had unknown beta/gamma with readings up to 500 R/h. The site was stabilized immediately after the burial. The trench involved was backfilled (Stenner et al. 1988).

8.4 218-E-12B BURIAL GROUND

This active burial ground is located about 1,000 ft north of the 241-C tank farm and about 4,500 ft north of PUREX (Maxfield 1979). The unit consists of 138 trenches running north to south. As of September 1982, 27 of the trenches were completely full, two were partially filled, and the remaining 109 trenches were empty (BHI 1994). The trenches are filled with miscellaneous wastes. A special study showed mixed fission products in part of trench 28 and transuranics in parts of trenches 17 and 27 (Maxfield 1979).

The burial grounds can be divided into two general sections, north and south, which are separated by a road. The southern section contains an eastern portion that is stabilized with soil and posted with underground contamination signs and concrete identification posts. The western half of the southern section is not stabilized and contains less vegetation than the eastern section. It has two open trenches that contain an abundant quantity of tumbleweed (site visit by authors, 1991).

The northern portion of the burial grounds consists of trench 94 in the east, which contains Navy reactor compartments and several borrow pits and spoil piles in the west. A barrier with surface contamination warning signs extends along the road separating the northern and southern portions of the burial grounds. The barrier also extends north to the 200 East Area perimeter fence (site visit by authors, 1991). The Navy reactor compartments contain lead shielding, with an anticipated minimum life expectancy for containment of 300 yr (Cramer 1987). The site is partially stabilized (BHI 1994).

8.5 UN-200-E-62 UNPLANNED RELEASE

UN-200-E-62 UPR occurred on March 19, 1982. Radioactive liquid was spilled from a pressure test assembly while in transit on a hill near the aboveground storage area. The ground contamination was picked up, placed in barrels, and removed to the burial ground. This was released from radiation area posting as it was cleaned to background level on March 22, 1982 (Cramer 1987). BHI (1994) coordinates suggest the site of the release is south of 218-E-8. There are no specific markers identifying the location of the release (site visit by authors, 1991).

8.6 UN-200-E-50 UNPLANNED RELEASE

This UPR consisted of wind blown contamination with unknown beta/gamma readings of 3,000 to 100,000 c/m southeast of the aboveground radioactive equipment storage yard, north of the 241-C tank farm (Stenner et al. 1988). It was ascribed to wind blown contaminated sand from areas that had not been properly decontaminated after storage of radioactive pumps. Coordinates listed in BHI (1994) suggest that the release was initiated in what is now the north-central portion of the 218-E-12A burial grounds. This area is marked with underground contamination signs. No separate markers were seen denoting this release in this area or in the vicinity of the 241-C tank farm during field inspections by the authors (site visit by authors, 1991).

9.0 REFERENCES/BIBLIOGRAPHY

AEC-GE, 1964, *Catalog of Hanford Buildings and Facilities*, GEH-26434, 3 Vol., Atomic Energy Commission - General Electric.

Anderson, 1976, *Input and Decayed Values of Radioactive Liquid Wastes Discharged to the Ground in the 200 Areas through 1975*, ARH-CD-745, Atlantic Richfield Hanford company, Richland, Washington.

Anderson, 1990, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.

Anderson, J. D., D. C. McCann, and B. E. Poremba, 1991, *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1990*, WHC-EP-0125-3, Westinghouse Hanford Company, Richland, Washington.

anonymous, 1991, Employee safety issues prompt changes at 103-C, October 7, 1991 issue of the Hanford Reach.

Baldridge, K. F., 1959, *Unconfined Underground Waste and Contamination in the 200 Area - 1959*, HW-60807, General Electric, Richland, Washington.

BHI, 1994, *Waste Information Data System*, Bechtel Hanford Inc., Richland, Washington.

Bovay Northwest Incorporated, 1991, *200 Area Sanitary Waste Disposal System's Survey and Interim Solutions, Hanford Site*, Richland, Washington.

Brown, M. J. R. K. P'Pool, and S. P. Thomas, 1990, *Effluent Discharges and Solid Waste Management Report for Calendar Year 1989 -- 200/600 Areas*, WHC-EP-141-2, Westinghouse Hanford Company, Richland, Washington.

Cammann, 1985, *RHO Design Analysis*, unpublished, dated 5/6/85, located in BHI (1994).

Coony, F. M. and S. P. Thomas, 1989, *Westinghouse Hanford Company Effluent Discharges and Solid Waste Management Report for Calendar Year 1988: 200/600 Areas*, WHC-EP-0141-2, Westinghouse Hanford Company, Richland, Washington.

Cramer, K. H., 1987, *Hanford Site Waste Management Units Report, May 1987*, Westinghouse Hanford Company, Richland, Washington.

Crusselle, A. A., and T. Romano, 1982, *Rockwell Retired Contaminated Facility Listing and Description*, SD-DD-FL-001, Rockwell Hanford Operations, Richland, Washington.

Cushing, C. E., 1990, *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6456, Rev. 3, Pacific Northwest Laboratory, Richland, Washington.

Diediker, L. P. and J. A. Hall, 1985, *Closure and Post-Closure Plan for the 1301-N and 1325-N Liquid Waste disposal Facilities*, UNI-3533, United Nuclear Industries, Richland, Washington.

DOE-RL, 1988, *Hanford Site Waste Management Units Report*, DOE/RL-88-30, Rev. 3, U.S. Department of Energy, Richland, Washington.

Ecology, DOE, EPA, 1991, *Hanford Federal Facility Agreement and Consent Order*, U.S. Department of Energy, U.S. Environmental Protection Agency, Washington State Department of Ecology, Olympia, Washington.

Fecht, K. R., G. V. Last, and K. R. Price, 1977, *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

Hanlon, B. M., 1991, *Tank Farm surveillance and Waste Status Report for July 1990*, WHC-EP-182-35, Westinghouse Hanford Company, Richland, Washington.

Harmon, K. M. et al. 1975, *Resource Book-Disposition (D&D) of Retired Contaminated Facilities at Hanford (Contaminated Liquid Disposal Sites*, 4 Vols., PNL-MA-588, Pacific Northwest Laboratory, Richland, Washington.

Hodges, W. R., 1989, *Radiological History of the PUREX Facility, 1955 to 1989*, unpublished document, Westinghouse Hanford Company, Richland, Washington.

Huckfeldt, C. R., 1990, *December field Notes for the 1990 Fourth Quarter Environmental Radiological Survey Summary*, WHC-SP-0595-3, Westinghouse Hanford Company, Richland, Washington.

Johnson, P. M., 1980, personal communication with J. D. Anderson (BHI 1994).

Kady, T. M. and R. B. Gelman, 1984, Internal Letter: Discharge to 216-A-8 Crib, RHO 65950-84-243, April 16, 1984, Rockwell Hanford Operations, Richland, Washington.

Kephart, G. S. and G. J. Sliger, 1980, *Radioactive Liquid Wastes Discharged to Ground in the 200 Areas during the First Three Quarters of 1978*, RHO-CD-78-34 3Q, Rockwell Hanford Operations, Richland, Washington.

Lundgren, L. L., 1970, *200 East and North Areas Radioactive Liquid Waste Disposal Sites*, ARH-1562, Atlantic Richfield Hanford Company, Richland, Washington.

Maxfield, H. L., 1979, *200 Area Waste Sites*, 3 Vols., RHO-CD-673, Rockwell Hanford Operations, Richland, Washington.

Maxfield, 1981, History Correspondence.

McCann, D. C. and T. S. Vail, 1984, *Waste Status Summary, April 1984*, RHO-RE-SR-14, Rockwell Hanford Operations, Richland, Washington.

McKenney, D. E. and E. R. Blevins, 1983, *Preliminary Design Criteria for the 241-TY Tank Farm Stabilization Demonstration (Done Fill)*, SD-WM-TI-119, Rockwell Hanford Operations, Richland, Washington.

Morton, R. L, 1980, *Current Status of Outdoor Rad Areas in the 200 Areas*, RHO-CD-1048, Rockwell Hanford Operations, Richland, Washington.

Myers, D. R. and W. F,. Heine, 1985, *Cleanup of Contaminated Area Around 244-A Lift Station*, Internal Letter #65632-85-107, Rockwell Hanford Operations, Richland, Washington.

Nelson, M. A., 1980, *Estimated Volume of Contaminated Soil in TRU/LLW Sites at Hanford*, Rockwell hanford Operations, RHO-CD-827, Richland, Washington.

Raol, R., 1991, personal commmunication, November 4, 1991.

Sisson, J. B. and A. H. Lu, 1984, *Field Calibration of Computer Models for Application to buried Liquid Discharges: A Status Report*, RHO-ST-46 P, Rockwell Hanford Operations, Richland, Washington.

Sliger, G. J., 1983, *Radioactive Liquid Wastes Discharged to Ground in the 200 Areas During 1982*, RHO-HS-SR-82-3-4Q LIQ, Rockwell Hanford Operations, Richland, Washington.

Smith, R. M., 1980, *216-B-5 Reverse Well Characterization Study*, RHO-ST-37, Rockwell hanford Operations, Richland, Washington.

Stalos, S. and C. M. Walker, 1977, *Waste Storage Tank Status and Leak Detection Criteria*, 4 Vols., RHO-CD-213, Rockwell Hanford Operations, Richland, Washington.

Stenner, R. D., K. H. Cramer, K. A. Higley, S. J. Jette, D. A. Lamar, T. J. McLaughlin, D. R. Sherwood, N. C. Van Houten, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford*, PNL-6456, Pacific Northwest Laboratory, Richland, Washington.

Tanaka, K. H., 1971, *B-Plant Ion Exchange Feed Line Leak*, ARH-1945, Atlantic Richfield Hanford Company, Richland, Washington.

Walsar, R. L. 1966, Letter from Rl L. Walsar to C. W. Malody, Subject: TBP-SOLTROL Solvent in TK-P3, dated October 20, 1966.

Wilson, 1982, *Project B-426, PUREX French Drain Elimination*, RHO-RE-ES-015, Rockwell Hanford Operations, Richland, Washington.

Table 9-1 provides a list of key documents used in preparing this report.

Table 9-1. Key References Containing Supporting Data.
(sheet 1 of 4)

Aldrich, R. C., 1985, *Radioactive Liquid Wastes Discharged to Ground in the 200 Area During 1984*: RHO-HS-SR-84-3 4Q Liq P. This report discusses radioactive discharges to the ground in the 200 Areas. There are tables of amounts of radioactive liquid put into sites, and totals of specific radioactive constituents. The report is issued quarterly.

Baldridge, K. F., 1959, *Unconfined Underground Radioactive Waste and Contamination in the 200 Areas-1959*: HW-60807. This report describes all waste sites and UPR locations, however the current numbering system was not used, and the only way to track these is by date and location. All of this information has been entered into BHI (1994).

Beard, S. J., and Godfrey W. L., 1967, *Waste Disposal Into the Ground at Hanford*: ISO-SA-31. Document discusses 1967 waste disposal practices at Hanford, as well as the types of waste streams disposed of at general waste disposal facilities.

Bliss, R. J., October 15, 1990, letter 9057173 subject; Hanford Waste Tanks, to R. E. Gerton, DOE-RL. The letter lists the tanks at Hanford that have the potential for an uncontrolled chemical reaction, and as such are of some concern.

Brown, D. J., 1971, *Radionuclide Distribution in 200 Area Sediments*: ARH-2213. The report attempts to provide an accurate inventory of the radionuclides deposited in the 200 Area sediments.

Curren, E. F., 1972, *200 Areas Disposal Sites for Radioactive Liquid Wastes*: ARH-947. This report has information in tables on each disposal site area. These tables include unit number, drawing number, type of wastes disposed, service dates, and status.

Delaney, C. D., *Geology and Hydrology of the Hanford Site: A standardized text For Use in Westinghouse Hanford Company Documents and Reports*: WHC-SD-ER-TI-0003. As suggested by the title, this report gives extensive information on the geology and hydrology of the Hanford Site.

DOE/RL-91-03, *Annual Report for RCRA Ground-Water Monitoring Projects at Hanford Site Facilities For 1990*. This is an excellent report summarizing groundwater monitoring at the Hanford Site.

Environmental Protection Files (unpublished), various dates and authors, stored at the Environmental Protection building in the 200 West Area. These files contain extensive information on UPRs and remedial action taken (if any) at the time of the release. These files can only be accessed in person and there is very limited help available for file searches.

Table 9-1. Key References Containing Supporting Data. (sheet 2 of 4)

Fecht, K. R., G. V. Last, and K. R. Price, 1977, *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*: ARH-ST-156 or UC-70, 3 volumes. This reports presents the detailed results of extensive scintillation surveys performed in 1967. Individual plots of logging runs and detailed well location maps, including boundaries of disposal sites, are included. The purpose of these surveys is to quantify the distribution, redistribution, and decay of radionuclides beneath crib facilities in the 200 Area.

Health Physics Scheduled and Supplemental Radiation Survey Forms (unpublished), 1990, stored at Health Physics building in the 200 West Area. These files contain extensive radiological data for annual, periodic, and special request surveys. Additional surveys of site-specific areas can be performed on short notice based on an informal request.

Held, K. R., 1956, *Unconfined Underground Radioactive Waste and Contamination in the 200 Areas*: HW-41535. This report has paragraph descriptions of waste sites and their status as of 1956. All of this information has been placed in BHI (1994).

Historical Unplanned Release File, Draft, 1986, Rockwell Hanford Operations. This report has one page summary reports on all past releases, however these releases do not have the current BHI (1994) numbering scheme, and as such can only be referenced by date and incident location. However most of this information has been placed in BHI (1994).

Hodges, W. R., 1989, *Radiological History of the PUREX Plant 1955 to 1989*. Excellent summary of what happened at PUREX. the title says it all.

HW-33305, *Radioactive Liquid Waste Disposal Facilities*, 1954. This document is a compilation of two other documents; HW-27227 and HW-28471. The report has tables composed of site name, structure, coordinates, elevation, waste source, and drawing references. All of this information has been placed in BHI (1994).

Jungfleisch, F. M., 1983, *Supplemental Information for Preliminary Evaluation of the Waste Inventory in Hanford Tanks through 1980*: SD-WM-TI-058 RO. This is a tabulation of the radioactive waste material in the tank farms by isotope with quantities listed in moles and activities in curies.

McCullugh, R. W., and J. R. Cartmell, 1968, *Chronological Records of Significant Events in Separations Operations*: ARH-780. This report has summary paragraphs of UPR sites in the 200 Areas. All of this information has been complied into BHI (1994).

Meinhardt, C. C., and J. C. Frostenson, 1979, *Current Status of 200 Area Ponds*: RHO-CD-798. This document discusses active (as of 1979) ditches, ponds, and retention basins used for the disposal of low-level waste, and their potential in keeping radiation from migrating.

Table 9-1. Key References Containing Supporting Data. (sheet 3 of 4)

Morton, R. L., 1980, *Current Status of Outdoor Radiation Areas in the 200 Areas*: RHO-CD-1048. This document presents tables of waste sites, their radiation contamination estimates and current zone posting.

Nelson, M. A., 1980, *Estimated Volume of Contaminated Soil in TRU/LLW Sites at Hanford*: RHO-CD-827. This report has complete descriptions/definitions of waste sites; such as cribs, trenches, etc. The back of the document has computer printouts of waste volumes sent to soil, and the amount of plutonium discharged in kgs and percent.

Oldhan, R. W., 1991, Westinghouse Internal Memorandum, Subject: Underground Injection Wells. This is a recently prepared summary of 28 french drains and underground injection wells that are located in the immediate vicinity of the PUREX Plant.

Open File Report 75-625, *Geology and Hydrology of Radioactive Solid-Waste Burial Grounds at the Hanford Reservation, Washington*. This document investigates the geology via the use of geologic cross sections and hydrology of the actual waste sites, using existing data. Much of this data is also contained in later geologic reports.

PNL-7346, *Hanford Site environmental report for calendar year 1989*. This report presents a good overview of the environmental monitoring programs at Hanford and includes summaries of soil, water, air, flora and fauna monitoring data.

Retired Facilities Quarterly Inspection Report Second Quarter FY1982, 1982, Radiological Engineering. The report discusses the results of the second quarter review of the investigated facilities. These facilities are found in both the 200 East and West Areas. There are complete schematics of each waste site included in the report.

RHO-LD-42, *Long-Term Management of Low-Level Waste Technology Development Program Plan, 1978*. This report discusses the technology development phase of the Long-Term Low-Level Waste Program.

Rodenhizer, D. G., 1987, *Hanford Waste Tank Sluicing History*: SD-WM-TI-302. This document consolidates all current information on past Hanford Site retrieval operations for the SSTs so that it can be applied to the double shell tanks.

Table 9-1. Key References Containing Supporting Data. (sheet 4 of 4)

Serkowski, J. A., A. G. Law, J. J. Ammerman, and A. L. Schatz, 1988, *Results of Ground-Water Monitoring for Radionuclides in the Separations Area-1987.* This report discusses active waste sites in the 200 Areas and the waste streams discharged to them. There are tables listing radiation concentrations in ground-water near selected waste sites.

Stenner, R. D., K. H. Cramer, K. A. Higley, S. J. Jette, D. A. Lamar, T. J. McLaughlin, D. R. Sherwood, and N. C. Van Houten, 1988, *Hazard Ranking Evaluation of CERCLA Inactive Waste Sites at Hanford*: PNL-6456 Volume 1. This report discusses Hanford Site geology, meteorology, and hydrology. Native biota, population and air quality are also touched upon. This document is one of the main BHI (1994) reference documents.

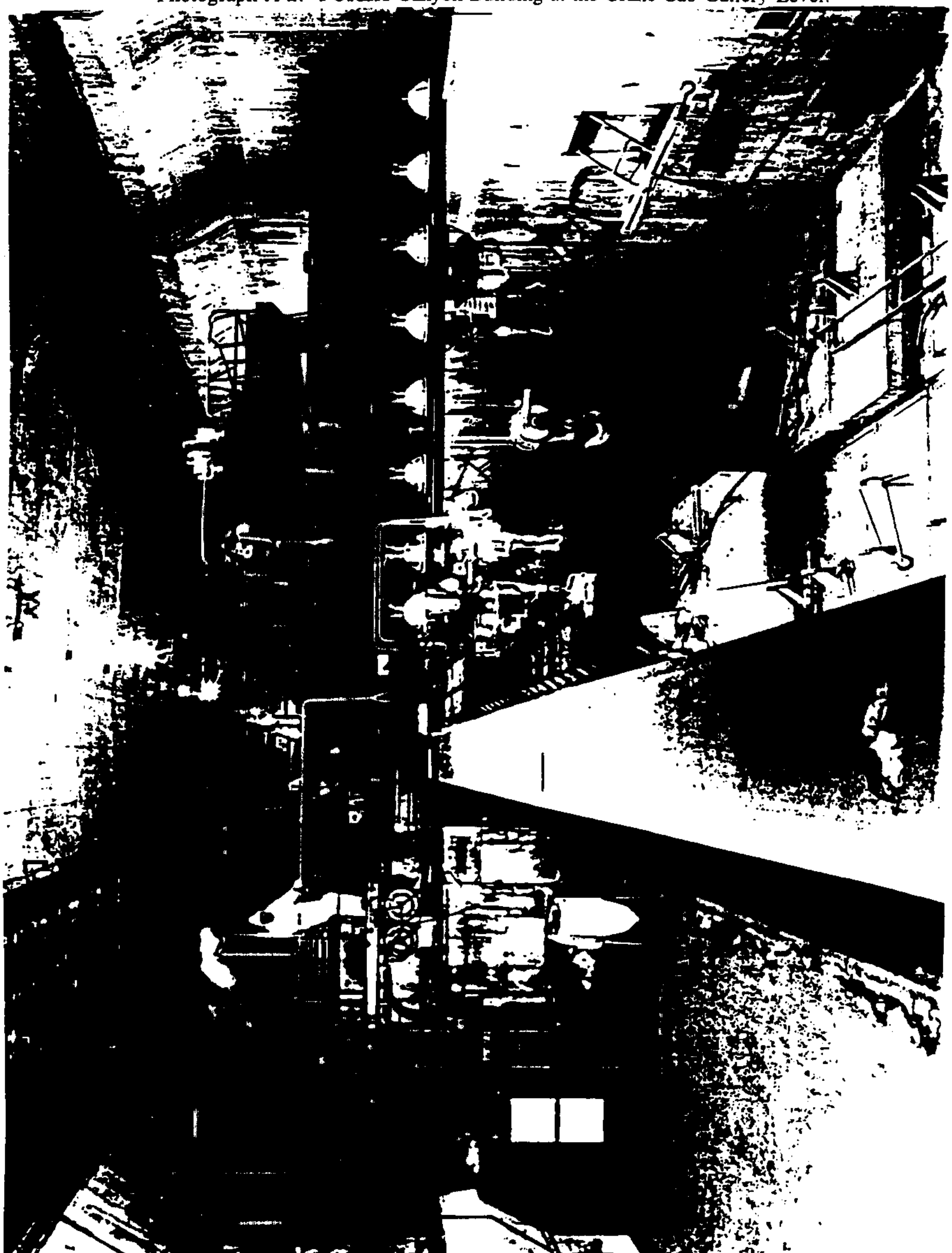
APPENDIX A

PHOTOGRAPHS

(Note: All photographs are poor quality reproductions taken from the original unpublished document.)

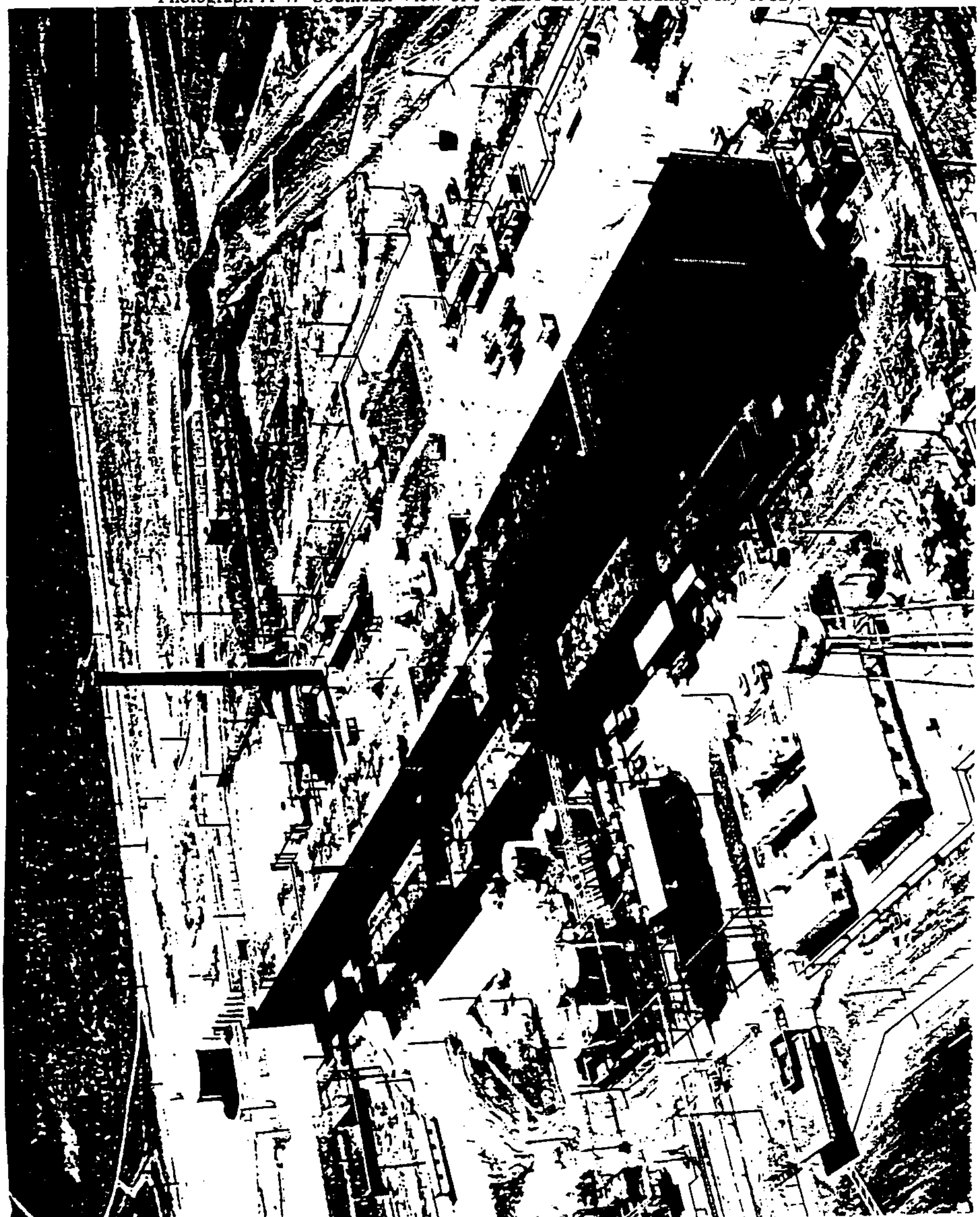
Photograph A-1. Southwest View Showing PUREX, 241-A and 241-AX Tank Farms.

Photograph A-2. PUREX Canyon Building at the Crane Cab Gallery Level.



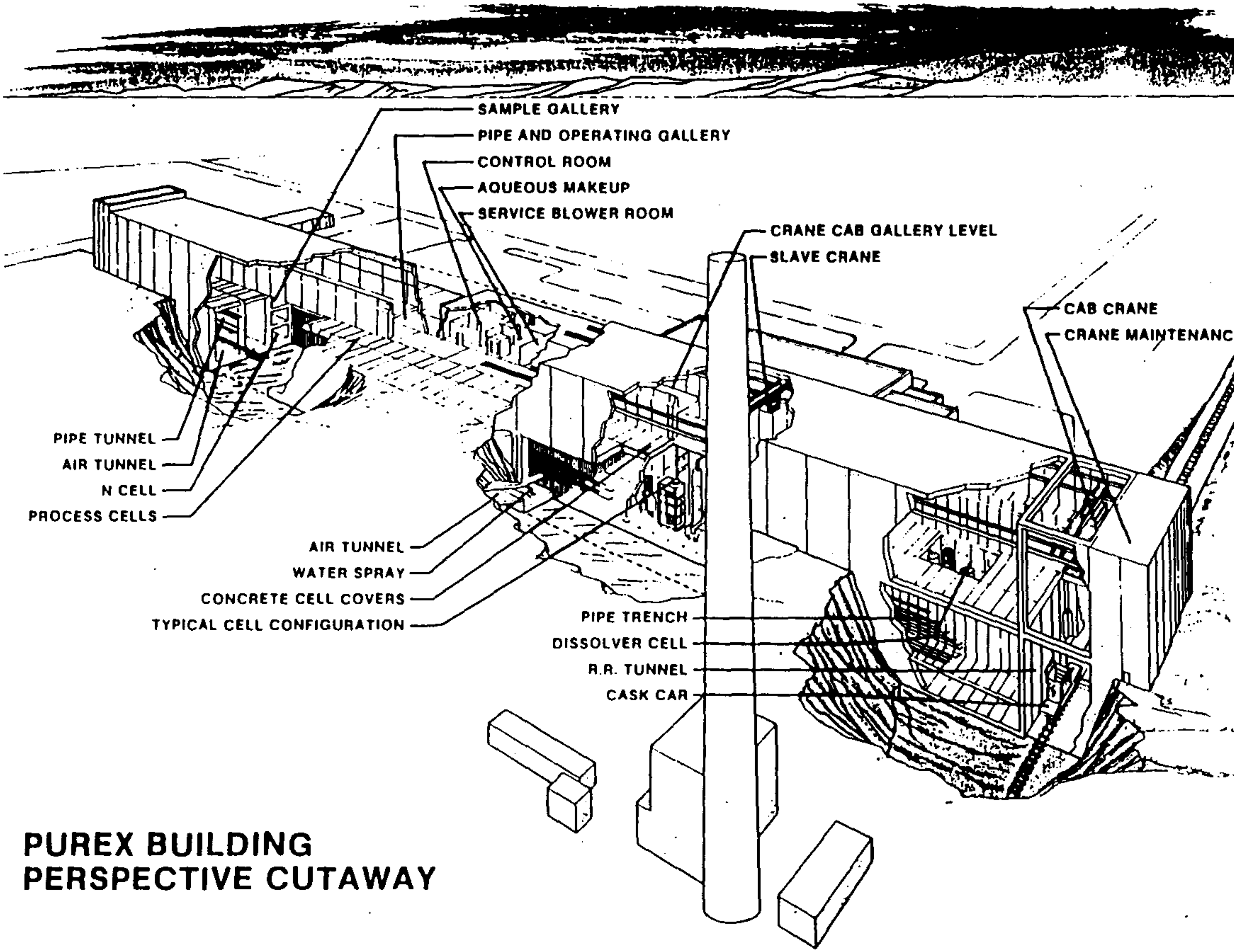
Photograph A-3. Aerial Photograph Showing Construction of the 241-AW Tank Farm.

Photograph A-4. Southeast View of PUREX Canyon Building (May 1982).



Photograph A-5. PUREX Canyon Building Looking South.

Photograph A-6. Aerial Photograph of the 200 East and West Areas.



Photograph A-7. Diagram of PUREX Canyon Building.

APPENDIX B

HANFORD SITE PHOTOGRAPH AND DRAWING LIST

Table B-1. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-1.

Site	Photograph	Key Drawing	Other Selected Drawings							
216-A-11	122440-191-CN	H-2-44501 #37	H-2-55091	H-2-55095	H-2-55090					
216-A-12	122440-190-CN	H-2-44501 #37	H-2-53014	H-2-55095	H-2-56521	H-2-55092	H-2-55900			
216-A-13	122440-187-CN	H-2-44501 #37	H-2-56521	SK-2-2568	H-2-55076	H-2-34762				
216-A-14	122440-189-CN	H-2-44501 #37	H-2-55090	H-2-53465						
216-A-22	122440-186-CN	H-2-44501 #48	H-2-54818	H-2-57043	H-2-57617	H-2-54812				
216-A-26	122440-193-CN	H-2-44501 #37	H-2-56521	H-2-3325	H-2-55036					
216-A-26A	122440-193-CN	H-2-44501 #37	H-2-56521	H-2-3325	H-2-55036					
216-A-28	122440-185-CN	H-2-44501 #48	H-2-57617							
216-A-3	122440-201-CN	H-2-44501 #48	H-2-55900	H-2-56049	H-2-56521	H-2-56050				
216-A-32	122440-202-CN	H-2-44501 #37	H-2-55900	H-2-55901	H-2-56000	H-2-57110				
216-A-33	122440-198-CN	H-2-44501 #37	H-2-55036	H-2-56521						
216-A-35	122440-188-CN	H-2-44501 #37	H-2-55076							
216-A-40	122440-180-CN	H-2-44501 #70	H-2-63083	H-2-63084	H-2-61979					
216-A-41	122440-183-CN	H-2-61975	H-2-63084	H-2-44501 #70						
216-A-9	122440-184-CN	H-2-55577	H-2-55578	H-2-55579	H-2-56521					
218-E-1	122440-111-CN	H-2-44501 #38	H-2-31269	H-2-124	H-2600-E #24	H-2-36442	H-2-44501 #38			
218-E-13	122440-207-CN	H-2-44500 #7	H-2-44501 #48							
241-A-151	none identified	H-2-44501 #37	H-2-44500#1	H-2-55101	H-2-55102	H-2-55132	H-2-71644	H-2-57032	H-2-5389	H-2-2338 #51
241-A-302A	none identified	H-2-44501 #37	H-2-71644	H-2-44500 #1						
2607-E6	none identified	H-2-44500 #2								
2607-EA	none identified	H-2-44501 #70								
UN-200-E-10	none identified	H-2-44501 #59	H-2-44501 #47							
UN-200-E-11	none identified	H-2-44501 #59								
UN-200-E-114	none identified	H-2-44501 #48								
UN-200-E-12	none identified	H-2600 #24	H-6-951							
UN-200-E-142	none identified	H-2-44501 #48	H-2-44501 #36							
UN-200-E-15	none identified	H-2-44501 #48								
UN-200-E-19	none identified	H-2-44501 #36								
UN-200-E-20	none identified	H-2600 #24								
UN-200-E-26	none identified	H-2-44501 #26								
UN-200-E-28	none identified	H-2-44501 #37								
UN-200-E-31	none identified	H-2-44501 #36								
UN-200-E-33	none identified	H-2-44501 #48								
UN-200-E-35	122440-207-CN	H-2-44501 #48								
UN-200-E-42	none identified	H-2-44501 #58								
UN-200-E-49	none identified	H-2-44501 #80								
UN-200-E-58	none identified	H-2-44501 #2								
UN-200-E-60	none identified	H-2-44501 #59								
UN-200-E-65	none identified	H-2-44501 #37								
UN-200-E-88	none identified	H-2-44501 #2								
UN-200-E-96	none identified	H-2-44501 #37								
UPR-200-E-17	none identified	H-2-44501 #48								

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Table B-2. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-2.

Site	Photograph	Key Drawing	Other Selected Drawings							
216-A-10	122440-113-CN	H-2-44501 #37	H-2-55578	H-2-56521	H-2-58131	H-2-55576	H-2-34761	H-2-44501 #26-2	H-2-44500 #1	H-3-57210
216-A-15	122440-199-CN	H-2-44501 #37	H-2-56045 #2							
216-A-2	122440-197-CN	H-2-44501 #37	H-2-56050	H-2-56521	H-2-55900	H-2-50049	H-2-5621	H-2-56049	H-2-5650	H-2-56016
216-A-21	122440-195-CN	H-2-44501 #37	H-2-57042	H-2-57043	H-2-57467	H-2-57579	H-2-57032			
216-A-27	none identified	H-2-44501 #26	H-2-57509	H-2-57508						
216-A-31	122440-194-CN	H-2-44501 #37	H-2-57934							
216-A-36A	122440-114-CN	H-2-44501 #37	H-2-59805	H-2-34761	H-2-57210	H-2-59129	H-2-2431			
216-A-36B	122440-114-CN	H-2-44501 #15	H-2-59805	H-2-34761	H-2-57210	H-2-59129				
216-A-38-1	122440-112-CN	H-2-44501 #38	H-2-62876	H-2-62877	SK-2-2160	H-2-62875	H-2-44501 #27			
216-A-4	122440-192-CN	H-2-44501 #37	H-2-56049	H-2-56521	H-2-56050					
216-A-45	none identified	H-2-44501 #7								
216-A-5	122440-200-CN	H-2-44501 #37	H-2-56050	H-2-56049	H-2-56521	H-2-55900				
299-E24-111	none identified	none identified								
UN-200-E-117	none identified	H-2-44501 #26								
UN-200-E-13	none identified	H-2-44501 #37								
UN-200-E-22	none identified	H-2-44501 #37								
UN-200-E-25	none identified	H-2-44501 #37								
UN-200-E-39	none identified	H-2-44501 #26	H-6-951							
UN-200-E-40	none identified	H-2-44501 #26								
UN-200-E-97	none identified	H-2-44501 #25	H-2600-E #24							
UPR-200-E-53	none identified	H-2-44501 #48	H-2-44500 #2							

Table B-3. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-3.

Site	Photograph	Key Drawing	Other Selected Drawings							
216-A-39	122440-204-CN	H-2-44501 #69	H-2-34761	H-2600-E #25	H-2-33295					
216-C-8	122440-90-CN	H-2-44500 #4	H-2-44501 #92	H-2-32523						
241-A-101	8600925-22-CN	H-2-32537	H-2-55910	H-2-63100	H-2-55901	H-2-55900	SK-2-18625	H-2-56971	H-2-5911	H-2-69163
241-A-102	8600925-22-CN	H-2-44501 #69	H-2-36065	H-2-55901	H-2-55900	SK-2-18625	H-2-56971	H-2-5911	H-2-69163	
241-A-103	8600925-22-CN	H-2-44501 #69	H-2-36066	H-2-55901	H-2-55900	SK-2-18625	H-2-56971	H-2-5911	H-2-69163	
241-A-104	8600925-22-CN	H-2-44501 #69	H-2-66006	H-2-55901	H-2-55900	SK-2-18625	H-2-56971	H-2-5911	H-2-69163	
241-A-105	8600925-22-CN	H-2-44501 #69	H-2-32537	H-2-55901	H-2-55900	H-2-63099	H-2-56971	H-2-5911	H-2-69163	SK-2-18625
241-A-106	8600925-22-CN	H-2-44501 #69	H-2-55901	H-2-55900	SK-2-18625	H-2-56971	H-2-5911	H-2-69163		
241-A-152	8600925-22-CN	H-2-44501 #69	H-2-55001	H-2-44500	H-2-55952 #1	H-2-55952 #2	H-2-55958 #1			
241-A-153	8600925-22-CN	H-2-2338 #55	H-2-61982	H-2-44501 #69						
241-A-350	8600925-22-CN	H-2-44501 #69								
241-A-417	8600925-22-CN	H-2-44501 #69								
241-A-431	8600925-22-CN	H-2-44501 #69	H-2-55940	H-2-55901						
241-A-A	8600925-22-CN	H-2-69150								
241-A-B	8600925-22-CN	H-2-69150	H-2-691							
241-AR-151	none identified	none identified								
241-AX-101	8600925-21-CN	H-2-44501 #69	H-2-68237	H-2-5911	H-2-34506	H-2-37854				
241-AX-102	8600925-21-CN	H-2-44501 #69	H-2-68239	H-2-5911	H-2-34506	H-2-37854				
241-AX-103	8600925-21-CN	H-2-44501 #69	H-2-37854	H-2-68239	H-2-34506	H-2-5911	H-2-34506			
241-AX-104	8600925-21-CN	H-2-44501 #69	H-2-68240	H-2-5911	H-2-34506	H-2-37854				
241-AX-151	8600925-21-CN	H-2-44501 #69	H-2-44752	H-2-44785	H-2-44790	H-2-44753	H-2-44791	H-2-5911	H-2-34506	
241-AX-152C	8600925-21-CN	H-2-44501 #69	H-2-44583	H-2-44584	H-2-44580	H-2-5911	H-2-34506			
241-AX-152D	8600925-21-CN	H-2-44501 #69	H-2-44582	H-2-44583	H-2-44584	H-2-44580	H-2-5911	H-2-34506		
241-AX-155	8600925-21-CN	H-2-90359								
241-AX-501	8600925-21-CN	H-2-44501 #69								
241-AX-A	8600925-21-CN	H-2-69150								
241-AX-B	8600925-21-CN	H-2-69150								
241-C-101	8600925-29-CN	H-2-44501 #92	H-2-2909	H-2-37001	H-2-73340	HW-72743		H-2-1744	H-2-73338	H-2-44500 #4
241-C-102	8600925-29-CN	H-2-44501 #92	H-2-73342	H-2-37002	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-103	8600925-29-CN	H-2-44501 #92	H-2-73343	H-2-37003	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-104	8600925-29-CN	H-2-44501 #92	H-2-73344	H-2-37004	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-105	8600925-29-CN	H-2-44501 #92	H-2-73345	H-2-37005	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-106	8600925-29-CN	H-2-44501 #92	H-2-73346	H-2-37006	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-107	8600925-29-CN	H-2-44501 #92	H-2-73347	H-2-37007	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-108	8600925-29-CN	H-2-44501 #92	H-2-73348	H-2-1744	H-2-73338	H-2-44500 #4				
241-C-109	8600925-29-CN	H-2-44501 #92	H-2-73349	H-2-37009	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-110	8600925-29-CN	H-2-44501 #92	H-2-73350	H-2-37010	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-111	8600925-29-CN	H-2-44501 #92	H-2-37011	H-2-73341	H-2-1744	H-2-73338	H-2-44500 #4			
241-C-112	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4					
241-C-151	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4					

Table B-3. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-3. (cont)

241-C-152	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-C-153	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-C-201	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	H-2-73353
241-C-202	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	H-2-73354
241-C-203	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	H-2-73355
241-C-204	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	H-2-23338
241-C-252	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-C-301C	8600925-29-CN	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-CR-151	none identified	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-CR-152	none identified	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-CR-153	none identified	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	
241-ER-153	none identified	H-2-44501 #92	H-2-1744	H-2-73338	H-2-44500 #4	H-2-37971
2607-ED	none identified	H-2-44501 #69				
2607-EG	none identified	H-2-44501 #92				
2607-EJ	none identified	H-2-44501 #58				
UN-200-E-100	none identified	H-2-44501 #81	H-2-44500 #4			
UN-200-E-107	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-115	none identified	H-2-44501 #69	H-2-44500 #1			
UN-200-E-118	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-119	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-125	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-126	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-136	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-137	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-16	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-18	none identified	H-2-44501 #69	H-2-44500 #1			
UN-200-E-27	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-47	none identified	H-2-44501 #69	H-2-44500 #1			
UN-200-E-48	none identified	H-2-44501 #69	H-2-44500 #1			
UN-200-E-68	none identified	H-2-44501 #70	H-2-44500 #4			
UN-200-E-72	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-81	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-82	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-86	none identified	H-2-44501 #92	H-2-44500 #4			
UN-200-E-91	none identified	H-2-44501 #92	H-2-44500 #4	H-2-34761	H-2600-E #24	
UN-200-E-94	none identified	H-2-44501 #90	H-2-44500 #4			
UN-200-E-99	none identified	H-2-44501 #92	H-2-44500 #4			
UPR-200-E-59	none identified	H-2-44501 #70	H-2-44500 #1			

Table B-4. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-4.

Site	Photograph	Key Drawing	Other Selected Drawings			
216-A-30	122440-3-CN	H-2-44501 #35	H-2-44501 #34	H-2-44500 #1	H-2-57720	H-2-57719
216-A-37-1	122440-1-CN	H-2-44501 #46	H-2-44501 #34	H-2-44500 #1		
216-A-37-2	122440-5-CN	H-2-44501 #34	H-2-44500 #1	H-2-62877	H-2-62876	
216-A-42	122440-2-CN	H-2-44501 #46	H-2-44500 #1	H-2-91138	H-2-91137	H-2-91136
216-A-6	122440-4-CN	H-2-44501 #47	H-2-44500 #1	H-2-64929	H-2-64933	
2607-EL	none identified	H-2-44501 #58	H-2-44500 #1	H-2-64929	H-2-5016	H-2-56015
UPR-200-E-21	none identified	H-2-44501 #47				
UPR-200-E-29	none identified	H-2-44501 #47				
UPR-200-E-66	none identified	H-2-44501 #46				

Table B-5. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-5.

Site	Photograph	Key Drawing	Other Selected Drawings		
207-A RB	none identified	H-2-44501 #58	H-2-44501 #69	H-2-44500 #1	H-2-69292
216-A-1	122440-17-CN	H-2-44501 #69	H-2-56016	H-2-44500 #1	
216-A-16	122440-181-CN	H-2-44501 #69	H-2-55943		
216-A-17	122440-181-CN	H-2-44501 #69	H-2-55943		
216-A-18	122440-14-CN	H-2-44501 #69	H-2-56119		
216-A-19	122440-12-CN	H-2-44501 #79	H-2-44500 #4		
216-A-20	122440-13-CN	H-2-44501 #79	H-2-44500 #4		
216-A-23A	122440-181-CN	H-2-44501 #69	H-2-56999		
216-A-23B	122440-181-CN	H-2-44501 #69	H-2-56999		
216-A-24	122440-10-CN	H-2-44501 #79	H-2-56997	H-2-56978	H-2-44500 #4
216-A-29	122440-6-CN	H-2-44500 #1			
216-A-34	122440-15-CN	H-2-34761	H-2-5600		
216-A-524	none identified	H-2-44501 #80	H-2-44500 #4		
216-A-7	122440-88-CN	H-2-44501 #69	H-2-44500 #1	H-2-56016	H-2-55951
216-A-8	122440-16-CN	H-2-44501 #68	H-2-44500 #1	H-2-56158	H-2-56157
241-A-302B	none identified	H-2-44501 #69			
2607-EC	none identified	H-2-44501 #69			
UN-200-E-56	none identified	H-2-44501 #79			
UN-200-E-67	none identified	H-2-44501 #58			

Table B-6. List of Photographs and Selected Technical Drawings for Operable Unit 200-PO-6.

Site	Photograph	Key Drawing	Other Selected Drawings					
200-E BP	none identified	H-2-32560	H-2-44501 #25	H-2-44500 #4	H-2-44500 #5			
218-E-12A	122440-95-CN	H-2-32560	H-2-57849	H-2-44500 #4	H-2-44500 #5	H-2-36442	H-2-31269	H-2-34761
218-E-12B	122440-93-CN	H-2-33276 #2	H-2-57849	H-2-44500 #4	H-2-44500 #5	H-2-31269	H-2-34761	
218-E-8	122440-87-CN	H-2-33276 #2	H-2-44501 #25	H-2-44500 #4	H-2-31269			
UN-200-E-62	none identified	H-2-33276 #2						
UPR-200-E-106	none identified	H-2-33276 #2						
UPR-200-E-24	none identified	H-2-32560						
UPR-200-E-30	none identified	H-2-32560						
UPR-200-E-50	none identified	H-2-32560						

APPENDIX C

TRAC DATABASE TANK FARM MODEL SUMMARY SHEETS

TRAC Database - Tank Farm Summary for the 241-A and 241-AX Tank Farms. (sheet 1 of 2)

Total (1/1/90)	A-101 Curies	A-102 Curies	A-103 Curies	A-104 Curies	A-105 Curies	A-106 Curies	AX-101 Curies	AX-102 Curies	AX-103 Curies	AX-104 Curies
1. Ac225	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
2. Ac227	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
3. Am241	1E+03	3E+03	5E+02	8E+02	1E-05	3E+02	3E+01	2E+01	2E+01	1E+02
4. Am242	9E-01	5E+00	9E-01	8E-01	1E-08	2E-01	9E-11	6E-17	3E-02	6E-02
5. Am242m	9E-01	5E+00	9E-01	8E-01	1E-08	2E-01	9E-11	6E-17	3E-02	6E-02
6. Am243	3E-01	2E+00	6E-01	3E-01	4E-09	7E-02	6E-11	1E-17	1E-02	3E-02
7. At217	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
8. Ba135m	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00
9. Ba137m	0E+00	3E+05	2E+04	1E-13	3E+04	3E-04	3E-06	4E-12	2E+04	1E+05
10. Bi210	3E-10	7E-10	1E-10	1E-10	9E-14	2E-10	5E-11	4E-11	6E-12	9E-11
11. Bi211	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
12. Bi213	8E-07	6E-07	5E-08	4E-07	5E-09	3E-07	3E-08	1E-08	3E-09	1E-08
13. Bi214	2E-09	3E-09	5E-10	7E-10	2E-13	1E-09	3E-10	1E-10	3E-11	4E-10
14. C14	0E+00	4E+02	3E+01	7E+02	5E+00	6E-02	1E-01	2E-15	9E+00	9E+01
15. Cm242	8E-01	4E+00	7E-01	7E-01	9E-09	2E-01	7E-11	5E-17	3E-02	5E-02
16. Cm244	0E+00	5E+00	4E+00	2E-20	4E-03	8E-10	5E-10	1E-18	6E-02	2E-01
17. Cm245	0E+00	3E-04	2E-04	7E-25	1E-07	4E-14	3E-14	7E-23	4E-06	1E-05
18. Cs135	0E+00	1E+00	8E-02	7E-19	1E-01	2E-09	1E-11	2E-17	1E-01	3E-01
19. Cs137	0E+00	3E+05	2E+04	1E-13	4E+04	3E-04	3E-06	4E-12	2E+04	1E+05
20. Fr221	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
21. Fr223	3E-07	2E-06	6E-07	1E-07	4E-08	1E-07	3E-08	1E-09	6E-08	1E-07
22. I129	0E+00	3E-01	1E-01	1E-19	1E-02	3E-10	1E-11	3E-18	2E-02	4E-02
23. Nb93m	4E+02	3E+02	9E+01	9E+01	1E-01	2E+02	8E+01	4E+01	3E+00	2E+02
24. Ni59	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00
25. Ni63	4E+04	1E+04	2E+04	7E+03	2E-05	4E+04	7E+02	2E+00	3E+02	8E+02
26. Np237	4E-03	3E-01	1E-02	5E-03	4E-02	1E-03	5E-05	4E-05	2E-02	3E-02
27. Np239	3E-01	2E+00	5E-01	3E-01	4E-09	7E-02	6E-11	1E-17	1E-02	3E-02
28. Pa231	9E-05	2E-04	1E-04	3E-05	4E-06	5E-05	1E-05	5E-07	8E-06	2E-05
29. Pa233	4E-03	3E-01	1E-02	5E-03	4E-02	1E-03	5E-05	4E-05	2E-02	3E-02
30. Pa234m	7E+00	1E+00	1E+00	2E+00	5E-09	4E+00	1E+00	4E-02	5E-09	1E-01
31. Pb209	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
32. Pb210	3E-10	6E-10	1E-10	1E-10	9E-14	2E-10	5E-11	4E-11	6E-12	9E-11
33. Pb211	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
34. Pb214	2E-09	3E-09	5E-10	7E-10	2E-13	1E-09	3E-10	1E-10	3E-11	4E-10
35. Pd107	0E+00	6E-01	2E-01	1E-19	3E-02	4E-10	3E-11	6E-18	3E-02	8E-02
36. Po210	3E-10	6E-10	1E-10	1E-10	9E-14	2E-10	5E-11	4E-11	5E-12	8E-11

TRAC Database - Tank Farm Summary for the 241-A and 241-AX Tank Farms. (sheet 2 of 2)

Total (1/1/90)	A-101 Curies	A-102 Curies	A-103 Curies	A-104 Curies	A-105 Curies	A-106 Curies	AX-101 Curies	AX-102 Curies	AX-103 Curies	AX-104 Curies
37. Po213	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
38. Po214	3E-09	4E-09	7E-10	1E-09	2E-13	1E-09	3E-10	1E-10	4E-11	5E-10
39. Po215	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
40. Po218	2E-09	3E-09	5E-10	7E-10	2E-13	1E-09	3E-10	1E-10	3E-11	4E-10
41. Pu238	8E+01	1E+01	2E+01	2E+01	4E-04	5E+01	2E+01	9E+00	2E-03	2E+01
42. Pu239	2E+03	3E+02	3E+02	6E+02	2E-06	1E+03	3E+02	1E+02	3E-05	3E+02
43. Pu240	6E+02	8E+01	9E+01	1E+02	1E-05	3E+02	8E+01	4E+01	1E-04	8E+01
44. Pu241	6E+03	7E+02	1E+03	1E+03	2E-06	3E+03	1E+03	7E+02	9E-05	1E+03
45. Ra223	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
46. Ra225	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
47. Ra226	2E-09	3E-09	5E-10	7E-10	2E-13	1E-09	3E-10	1E-10	3E-11	4E-10
48. Ru106	4E-01	3E-01	2E+00	4E-02	1E-07	1E+00	8E+00	7E+00	7E-03	6E+00
49. Sb126	3E+01	1E+02	7E-01	3E+01	1E-07	6E+00	7E-11	2E+01	2E+00	6E+01
50. Sb126m	3E+01	1E+02	7E-01	3E+01	1E-07	6E+00	7E-11	2E+01	2E+00	6E+01
51. Se79	0E+00	6E+00	2E+00	2E-18	3E-01	5E-09	2E-10	4E-17	4E-01	8E-01
52. Sm151	4E+04	1E+05	7E+02	3E+04	9E-05	7E+03	7E-08	1E+04	2E+03	6E+04
53. Sn126	3E+01	1E+02	7E-01	3E+01	1E-07	6E+00	7E-11	2E+01	2E+00	6E+01
54. Sr90	3E+06	7E+06	2E+04	4E+06	3E-02	5E-03	3E-06	1E-10	2E+04	9E+06
55. Tc99	0E+00	2E+02	7E+01	6E-17	1E+01	2E-07	2E-08	1E-15	1E+01	3E+01
56. Th227	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	4E-06	8E-06
57. Th229	8E-07	6E-07	5E-08	4E-07	4E-09	3E-07	3E-08	1E-08	3E-09	1E-08
58. Th230	8E-07	5E-07	2E-07	2E-07	3E-12	4E-07	1E-07	4E-08	5E-09	1E-07
59. Th231	3E-01	4E-02	6E-02	8E-02	1E-10	2E-01	5E-02	2E-03	3E-13	6E-03
60. Th233	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00
61. Th234	7E+00	1E+00	1E+00	2E+00	5E-09	4E+00	1E+00	4E-02	5E-09	1E-01
62. Tl207	2E-05	1E-04	4E-05	7E-06	3E-06	9E-06	2E-06	8E-08	5E-06	1E-05
63. U233	6E-04	7E-05	5E-05	2E-04	4E-06	2E-04	3E-05	5E-06	9E-07	5E-06
64. U234	8E-03	1E-03	2E-03	2E-03	3E-08	4E-03	2E-03	5E-04	6E-08	1E-03
65. U235	3E-01	4E-02	6E-02	8E-02	1E-10	2E-01	5E-02	2E-03	3E-13	6E-03
66. U238	7E+00	1E+00	1E+00	2E+00	5E-09	4E+00	1E+00	4E-02	5E-09	1E-01
67. Y90	3E+06	7E+06	2E+04	4E+06	3E-02	5E-03	3E-06	1E-10	2E+04	9E+06
68. Zr93	7E+02	1E+02	2E+02	1E+02	5E-07	5E+02	2E+02	8E+01	9E-07	3E+02
TOTAL CURIES	6.09E+06	1.47E+07	1.03E+05	8.04E+06	7.00E+04	5.24E+04	2.42E+03	1.11E+04	8.23E+04	1.83E+07
TOTAL TRU	3083.204	3748.660	873.7202	2122.908	5.040418	1350.801	350.1000	129.0000	29.13213	520.2642

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